SERVICE MANUAL

INPUT MODULE
Type 2514-01,02
-06,07

(For Type 2504 Digital AC Meter)

YEW

YOKOGAWA ELECTRIC WORKS, LTD.

SERVICE MANUAL

SINGLE INPUT MODULE Type 2514-01,02

(For Type 2504 Digital AC Meter)

1975.09.20 — 1st Edition

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1. DESCRIPTION AND OPERATING PRINCIPLE

1.1 Description

Type 2514-01 and 02 are single-range plug-in input modules for Type 2504 Digital AC Meter, and are normally connected with external PT and CT. Measuring ranges for each version are as given below.

	2514-01	2514-02
Voltage Range	100V	150V
Current Range	5A	5A

Voltage and current inputs are isolated from an input module by means of PT and CT respectively. The output is 1 V rms for both voltage and current sides, and sent out to Type 2504 through a connector located at the lower section of the rear panel.

A range signal is simultaneously sent out to Type 2504, and the display will be scaling with unit mark and decimal point for Type 2504-□1 having a ranging card ass'y, and a normalized indication which has a full scale reading of 1,0000 without a unit mark for Type 2504-□5 having no ranging card.

1.2 Operating Principle

The internal construction of Type 2514-01 and 02 is the same as the subsequently discussed Type 2514-06 and 07 multi-range input modules minus selector switches. For details of the operating principle, therefore, refer to Chapter 1 of the service manual for Type 2514-06 and 07.

2. TEST AND ADJUSTMENT

This chapter concerns test and adjustment of Type 2514-01 and 02, and related specifications.

2.1 Specifications

Type 2514-01 and 02 are intended for combination, as input modules, with Type 2504-□□ (2504-01, 05; 11, 15; and 21, 25). Their common specifications are stated at the beginning, and specifications of each measuring function are given in tables.

- ○ Input type: Floating
- ○ Effective measuring span: 30 to 110% of rated value combined with Type 2504-□□ (0 to 110% of rated value for input module alone)
- ○ Operating temperature range: 5 to 40°C combined with Type 2504-□□ (−10 to +55°C for input module alone)
- ○ Warmup: Approx. 20 min combined with Type 2504-□□ (Approx. 10 min for input module alone)
- ○ Dielectric strength: 2,200 V ac, 50/60 Hz, 1 min
  Between each input terminal and case
  Between each input terminal and output
  Between voltage terminal and current terminal
- ○ Insulation resistance: 50 MΩ min. at 500 V dc
  Between each input terminal and case
  Between each input terminal and output terminal
  Between voltage terminal and current terminal
- ○ Power consumption: Approx. 22 VA combined with Type 2504-□□ (Approx. 0.3 VA for input module alone)
- ○ Dimensions and weight: Approx. 138 x 70 x 368 mm
  Approx. 2.6 kg

○ Output terminal signal:

Table 2-1

Pin No.	Details	
	2514-01	2514-02
1		
2		
3		
4	100 V range signal	
5		150 V range signal
6		
7		
8	Range SEL	Range SEL
9	Voltage output Vin (1)	Voltage output Vin (1)
10	S.G.	S.G.
11	+15 V power	+15 V power
12		
13		
14		
15		
16		
17	5 A range signal	5 A range signal
18		
19		
20		
21	Current output Ain (1)	Current output Ain (1)
22	P.G.	P.G.
23	−15 V power	−15 V power
24		

(Connector used: 57-10240)

Table 2-2 Specifications of Type 2514-01

Combined with 2504-□□	2504-21, 25		2504-01, 05
	2504-11, 15		
Meas. function / Spec, item	Voltage	Current	Power
Operating principle	PT isolation	CT isolation	Same as in voltage, current
Rated input	100 V	5 A	500W
Resolution	10 mV/digit	1 mA/digit	100 mW/digit
Freq. range	25 Hz to 2 kHz	25 Hz to 2 kHz	40 Hz to 1.2 kHz
Allowable input crest factor	2 max. at rated value	3 max. at rated value	Same as in voltage, current
Accuracy	47 to 63 Hz : ± (0.25% of rdg + 0.05% of range)		
Combined with 2504-□□ Amb. temp. : 23 ± 3°C Amb. humid. : 45 to 75% RH Source V : 100V ± 1% Input waveform : Sinusoidal Calib. cycle : 90 days	25 to 47 Hz and 63 Hz to 2 kHz: ± (0.5% of rdg + 0.1% of range)		40 to 47 Hz and 63 Hz to 1.2 kHz ± (0.5% of rdg + 0.1% of range)
	Voltage, current waveform output at 47 to 63 Hz, output current 1 mA rms max., at rated input : 1 V rms ± 0.15%		Influence of power factor ± 0.14% of range at cos φ = 0 ± 0.25% of rdg at cos φ = 0.5 ± 0.7% of rdg at cos φ = 0.2
Tem. coefficient Combined with 2504-□□ 5 to 20°C, 26 to 40°C 50 Hz to 1 kHz	Within ± 0.05% of range/°C		Within ± 0.025% of range/°C
Instrument loss	Approx. 50 kΩ (at 50 Hz)	Approx. 0.4 VA (at 50 Hz)	Same as in voltage, current
Max. alowable cont. input.	300 V peak	15 A peak	
Max. allowable inst. input (1 sec)	350 V peak	50 A peak	
Max. allowable cont. common-mode voltage At 50 or 60 Hz	1,000 V	1,000 V	
Influence of common-mode voltage At 50 or 60 Hz	Common-mode voltage rejection ratio 80 dB min. at 1,000 V applied between input terminals connected together and case	Within ± 0.025% of range at 1,000 V applied between input terminal and case	Within ± 0.025% of range at 1,000 V applied between voltage terminal and current terminal, or between input terminal and case

Table 2-3 Specifications of Type 2514-02

Combined with 2504-□□	2504-21, 25		2504-01, 05
	2504-11, 15		
Meas. function / Spec. item	Voltage	Current	Power
Operating principle	PT isolation	CT isolation	Same as in voltage, current
Rated input	150V	5A	750W
Resolution	100 mV/digit	1 mA/digit	100 mW/digit
Freq. range	25 Hz to 2 kHz	25 Hz to 2 kHz	40 Hz to 1.2 kHz
Allowable input crest factor	2 max. at rated value	3 max. at rated value	Same as in voltage, current
Accuracy	47 to 63 Hz : ± (0.25% of rdg + 0.05% of range)		
Combined with 2504-□□ Amb. temp. : 23 ± 3°C Amb. humid. : 45 to 75% RH Source V : 100V ±1% Input waveform : Sinusoidal Calib. cycle : 90 days	25 to 47 Hz and 63 Hz to 2 kHz: ± (0.5% of rag + 0.1% of range)		40 to 47 Hz and 63 Hz to 1.2 kHz ± (0.5% of rdg + 0.1% of range)
	Volatge, current waveform output at 47 to 63 Hz, output current 1 mA rms max., at rated input : 1 V rms ± 0.15%		Influence of power factor ± 0.14% of range at cos φ = 0 ± 0.25% of rdg at cos φ = 0.5 ±0.7% of rdg at cos φ = 0.2
Tem. coefficient Combined with 2504-□□ 5 to 20°C, 26 to 40° C 50 Hz to 1 kHz	Within ± 0.05% of range/°C		Within ± 0.025% of range/°C
Instrument loss	Approx. 100 kΩ (at 50 Hz)	Approx. 0.4 VA (at 50 Hz)	Same as in voltage, current
Max. allowable cont. input	400 V peak	15 A peak	
Max. allowable inst. input (1 sec)	500 V peak	50 A peak	
Max. allowable cont. common-mode voltage At 50 or 60 Hz	1,000 V	1,000 V	
Influence of common-mode voltage At 50 or 60 Hz	Common-mode voltage rejection ratio 80 dB min. at 1,000 V applied between input terminals connected together and case	Within ± 0.025% of range at 1,000 V applied between input termainal and case	Within ± 0.025% of range at 1,000 V applied between voltage terminal and current terminal, or between input terminal and case

2.2 Performance Test Standards

Performance test standards are based on those for Type 2514-06 and 07 to be discussed later, in which 100 V and 5 A ranges only are applied.

For Type 2514-02, 100 V is changed to read 150 V, and the test is effected at 150 V and 5 A. In this case, main alterations are as follows.

- Overinput test: Voltage side. . . . 400 V ac, 10 sec
- Linearity test: Voltage side. . . . 165 V, 150 V, 100 V, 75 V, 30 V

2.3 Test Method

Based on the test method stated for Type 2514-06 and 07. For Type 2514-01, 100 V and 5 A ranges are applied, and for Type 2514-02, 100 V is changed to read 150 V.

2.4 Adjustment

Based on the adjustment for Type 2514-06 and 07. For Type 2514-02, however,

- In the f.s. confirmation, make sure that display of Type 2504-11 will be 150.0 V ± 2digits and 5.000 A ± 6 digits.
- In the phase adjustment, adjust C3 so that the display at W measurement will have an error within ± 5 digits when 150 V and 5 A at 50/60 Hz and power factor zero are applied.

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3. TROUBLESHOOTING

Because the circuit construction of Type 2514-01 and 02 is quite simple as is clear from Figs. 4-1 and 4-2, an explanation on troubleshooting is omitted.

4. CIRCUIT DIAGRAMS AND PARTS LOCATION

Type 2514-01, 02 INPUT MODULE
Contents of Circuit Diagrams & Parts Location

Par.	Description	Ass'y No.	Fig. No.	Page
1	OVERALL WIRING	AS B9254DC	4 – 1	4 – 4
		AS B9254EC	4 – 1	4 – 4
2	INPUT AMPLIFIER PCB ASS'Y	AS B9254BJ	4 – 2a	4 – 6
	PCB ASS'Y PARTS LOCATION	AS B9254BK	4 – 2b	4 – 6

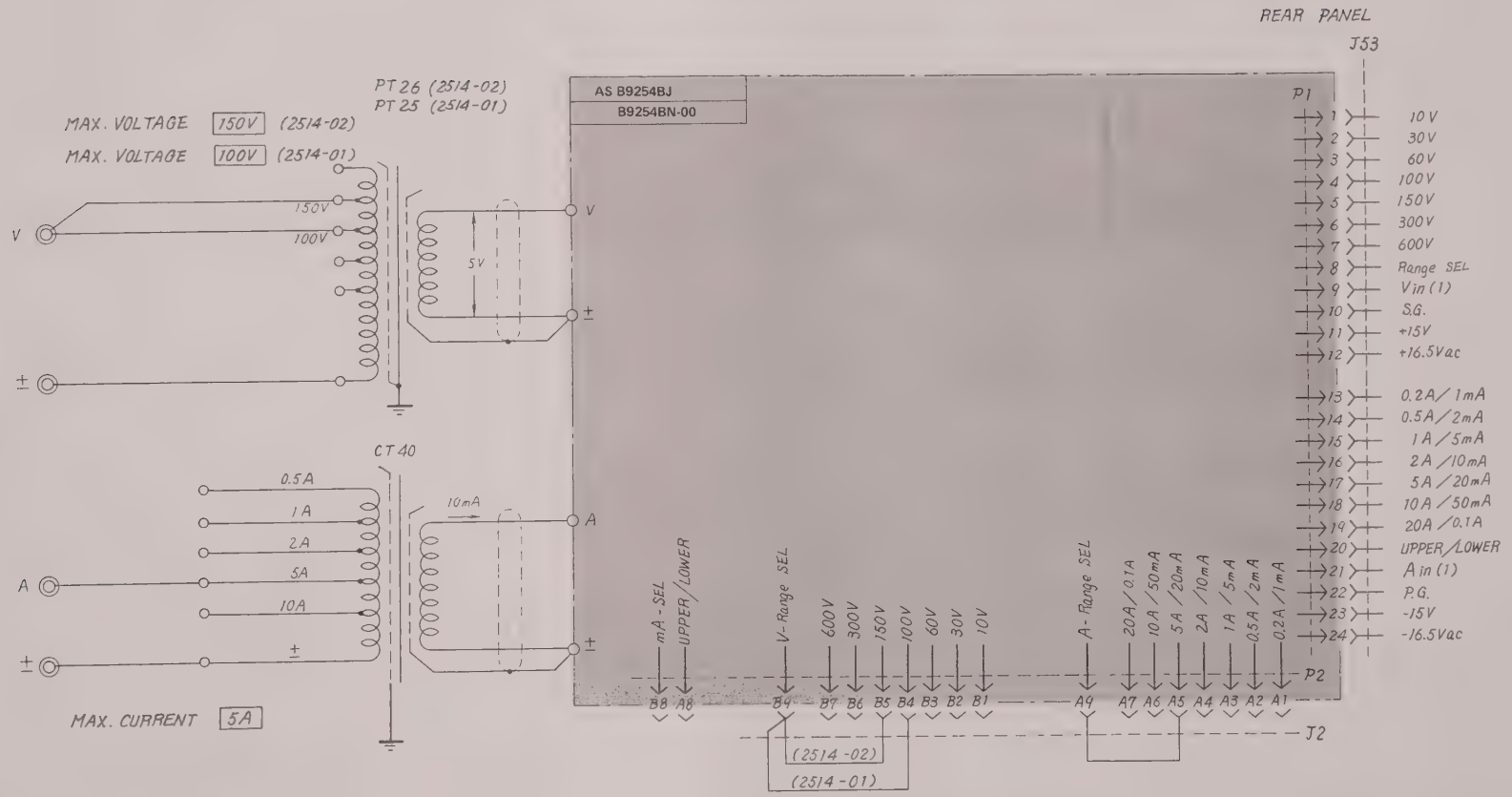

Fig. 4-1
Input Module Ass'y:
Type 2514-01 (AS B9254DC)
& Type 2514-02 (AS B9254EC)
Overall Wiring

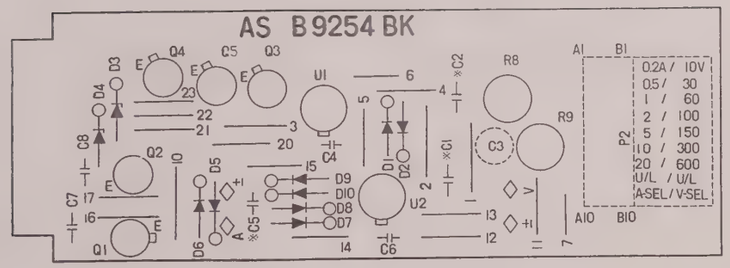

Fig. 4-2b PCB Ass'y: AS B9254BK Parts Location

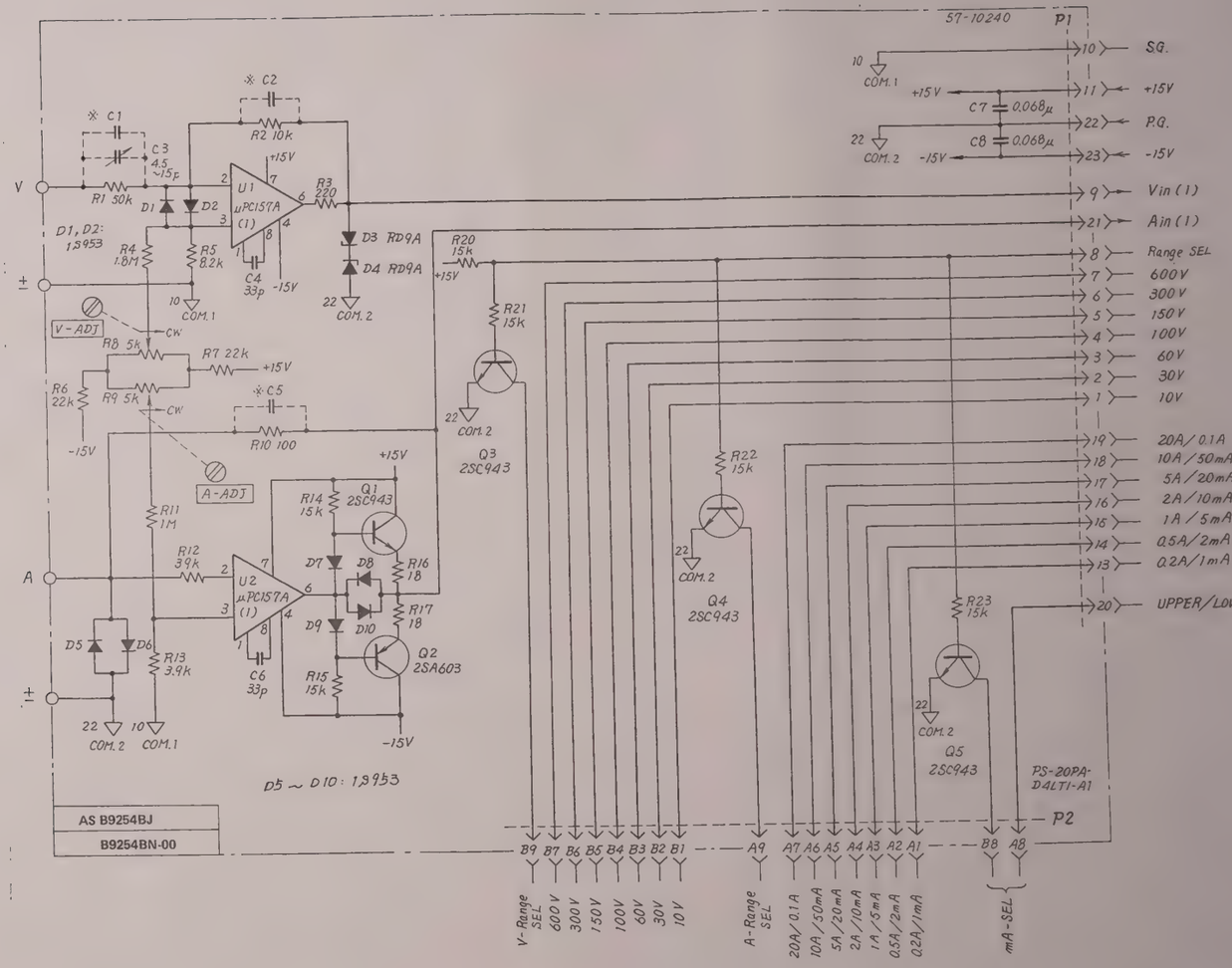

Fig. 4-2a
Input Amplifier
PCB Ass'y: AS B9254BJ

5. PARTS LIST AND STRUCTURAL DIAGRAMS

Contents of Parts List

Par.	Description	Ass'y No.	Fig. No.	Page
5 - 1	INPUT MODULE ASS'Y	AS B9254DC	4 – 1	5 – 3
		AS B9254EC		
5 - 2	INPUT AMPLIFIER PCB ASS'Y	AS B9254BJ	4 – 2a, b	5 – 4

Contents of Structural Diagrams

Par.	Description	Ass'y No.	Fig. No.	Page
1	INPUT MODULE ASS'Y	AS B9254DC	5 – 1	5 – 8
		AS B9254EC		
2	PANEL ASS'Y (Rear)	AS B9254AT	5 – 2	5 – 9
3	PANEL ASS'Y (Front)	AS B9254DE	5 – 3a	5 – 12
		AS B9254EE	5 – 3b	
4	INPUT AMPLIFIER PCB ASS'Y	AS B9254BJ	5 – 4	5 – 13

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List of abbreviations

ac	=	alternating current
Ag	=	silver (ed)
Al	=	aluminum
amp	=	amplifier
ass'y	=	assembly
Au	=	gold
car film	=	carbon film
cap	=	capacitor
cct	=	circuit
cer	=	ceramic
coef	=	coefficient
com	=	common
comp	=	composition
conn	=	connector
dc	=	direct current
dia	=	diameter
elect	=	electrolytic
FET	=	field effect transistor
flm	=	film
fxd	=	fixed
Ge	=	germanium
gnd	=	ground
IC	=	integrated circuit
JIS	=	Japanese Industrial Standard
L	=	inductor
met	=	metal (lized)
mfr	=	manufacturer
Ne	=	neon
nom val	=	nominal value
OSC	=	oscillator
pcb	=	printed circuit board
pwb	=	printed wiring board
plstc	=	plastic
polye	=	polyester
polys	=	polystyrene
pot	=	potentiometer
prec	=	precision (temperature coefficient, long term stability, and/or tolerance)
res	=	resistor
rng	=	range
rtry	=	rotary
Se	=	selenium
sect	=	section(s)
Si	=	silicon
sub-ass'y	=	sub-assembly
sw	=	switch
sys	=	system
sply	=	supply
Ta	=	tantalum
temp	=	temperature
trim	=	trimmer
TSTR	=	transistor
trans	=	transformer
var	=	variable
ww	=	wire wound
YEW spec	=	special specification of Yokogawa Electric Works, Ltd. - YEW.

†	=	Request the item marked with † to YEW.
††	=	Replace the item marked with †† as a complete part set even when one of its parts is damaged. Request the complete part set to YEW.
†††	=	Replace the item marked with ††† as an assembly even when a part of it is damaged. Request the assembly to YEW.
††††	=	Optimum value selected at factory, average value shown (part may be omitted).

Example

Conn	:	multi	=	multi connector
Cap	:	fxd Al elect	=	Fixed aluminum electrolytic capacitor
Cap	:	fxd met polye flm	=	Fixed metallized polyester film capacitor
PCB Ass'y or PCB-Ass'y			=	Printed circuit board assembly
Res	:	fxd car flm	=	Fixed carbon film resistor
Res	:	var ww	=	Wirewound variable resistor
Temp coef			=	Temperature coefficient

5.1 INPUT MODULE ASS'Y: Type 2514-01 (AS B9254DC), Type 2514-02 (AS B9254EC)

Item	Part No.	Part Name and Description			Manufacturer	Remarks
	B9254AG	Rod	(2 pcs.)		YEW	
	B9254AH	Rod	(2 pcs.)		YEW	
	B9254AD	Plate			YEW	
	B9254AJ	Plate			YEW	
	B9254AK	Gasket			YEW	
	B9254AL	Plate			YEW	
	B9254AM	Cover			YEW	
	B9254AN	Cover			YEW	
	B9254AT	Panel Ass'y			YEW	see Fig. 5-2
	B9254DE	Panet Ass'y			YEW	see Fig. 5-3a for 2514-01
	B9254EE	Panel Ass'y			YEW	See Fig. 5-3b for 2514-02
	B9254BA	Plate			YEW	
	B9254BE	Screw Ass'y			YEW	
	A9335ZJ	Name plate			YEW	see Fig. 5-1 for 2514-01
	A9342ZJ	Name plate			YEW	see Fig. 5-1 for 2514-02
	A9091ZJ	Name plate			YEW	
	B9254BB	Bracket			YEW	
	A9020ZB	Panel lock Ass'y		CD03	YEW	
	Y9050LH	Clamp	(2 pcs.)		YEW	
	Y9408EB	Screw	(8 pcs.)	ϕ4 · ℓ8 · p0.7 · EB	YEW	
	Y9412JB	Screw	(4 pcs.)	ϕ4 · ℓ12 · p0.7 · JB	YEW	
	Y9306JB	Screw	(14 pcs.)	ϕ3 · ℓ6 · p0.5 · JB	YEW	
	Y9906JB	Screw	(2 pcs.)	ϕ2.6 · ℓ6 · p0.45 · JB	YEW	
	Y9408JB	Screw	(2 pcs.)	ϕ4 · ℓ8 · p0.7 · JB	YEW	
	Y9305EB	Screw	(8 pcs.)	ϕ3 · ℓ5 · p0.5 · EB	YEW	
	Y9501WB	Washer	(2 pcs.)	ϕ5.5	YEW	
	Y9300SP	Washer: Spring	(22 pcs.)	ϕ3	YEW	
	Y9400SP	Washer: Spring	(6 pcs.)	ϕ4	YEW	
	Y9260SP	Washer: Spring	(2 pcs.)	ϕ2.6	YEW	
	Y9500SP	Washer: Spring		ϕ5	YEW	
	Y9300WB	Washer	(6 pcs.)	ϕ3	YEW	
	Y9400WB	Washer	(4 pcs)	ϕ4	YEW	
	Y9301BB	Nut	(8 pcs.)	M3 x 0.5	YEW	
	Y9501BB	Nut	(2 pcs.)	M5 x 0.8	YEW	
J2	A9108KP	Conn: Jack		PS-20SD-D4C2	JAE	
	A9120KP	Socket Contact	(5 pcs.)	PS-SD-C2N-1	JAE	
PT25	A9309MT	Trans: Potential			YEW	for 2514-01
PT26	A9366MT	Trans: Potential			YEW	for 2514-02
CT40	A9310MT	Trans: Current			YEW	
	B9254BJ	PCB Ass'y			YEW	see 5.2, Fig. 5-4

5.2 INPUT AMPLIFIER PCB ASS'Y : AS B9254BJ

Item	Part No.	Part Name and Description		Manufactuer	Remarks
	B9254BK	PCB Ass'y		YEW	see 5.2.1
P1	A9020KC	Conn : plug	57-10240	AMPHENOL	
P2	A9105KP	Conn : plug	PA-20PA-D4LT1-A1	JAE	

5.2.1 PCB ASS'Y : AS B9254BK

Item	Part No.	Part Name and Description					Manufacturer	Remarks
R1	A9189RN	Res: fed met flm	50kΩ	±0.05%	1/8W	RN60E50kΩA	TOKYO KO-ON	±25ppm/°C
R2	A9185RN	Res: fxd met flm	10kΩ	±0.05%	1/8W	RN60E10kΩA	TOKYO KO-ON	±25ppm/°C
R3	A9025RS	Res: fxd car comp	220Ω	±10%	¼W	RC¼GF220ΩK		
R4	A9072RS	Res: fxd car comp	1.8MΩ	±10%	¼W	RC¼GF1.8MΩK		
R5	A9044RS	Res: fxd car comp	8.2kΩ	±10%	¼W	RC¼GF8.2kΩK		
R6	A9172RM	Res: fxd met flm	22kΩ	±5%	¼W	RE50YR22kΩJ	SUSUMU	
R7	A9172RM	Res: fxd met flm	22kΩ	±5%	¼W	RE50YR22kΩJ	SUSUMU	
R8	A9403RV	Res: var ww	5kΩ	±10%	0.37W	λ-6F 5kΩ	COPAL	
R9	A9403RV	Res: var ww	5kΩ	±10%	0.37W	λ-6F 5kΩ	COPAL	
R10	A9169RN	Res: fxd met flm	100Ω	±0.05%	1/8W	RN60E100ΩA	TOKYO KO-ON	±25ppm/°C
R11	A9069RS	Res: fxd car comp	1MΩ	±10%	¼W	RC¼GF1MΩK		
R12	A9040RS	Res: fxd car comp	3.9kΩ	±10%	¼W	RC¼GF3.9kΩK		
R13	A9040RS	Res: fxd car comp	3.9kΩ	±10%	¼W	RC¼GF3.9kΩK		
R14	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R15	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R16	A9013RS	Res: fxd car comp	22Ω	±10%	¼W	RC¼GF22ΩK		
R17	A9013RS	Res: fxd car comp	22Ω	±10%	¼W	RC¼GF22ΩK		
R18		not used						
R19		not used						
R20	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R21	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R22	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R23	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
C1	A9014CN	Cap: fxd mica	12pF	±10%	100V	DM05C120K1	NITSUKO	††††
C2	A9027CN	Cap: fxd mica	150pF	±10%	100V	DM05C151K1	MITSUKO	††††
C3	A9023CV	Cap: var cer	4.5~15pF		60V	DT-05D150	MURATA	
C4	A9019CN	Cap: fxd mica	33pF	±10%	100V	DM05C330K1	NITSUKO	
C5	G9025CY	Cap: fxd polye flm	6,800pF	±10%	50V	MFL-5002-682K	MATSUO	††††
C6	A9019CN	Cap: fxd mica	33pF	±10%	100V	DM05C330K1	NITSUKO	
D1	G9001HD	Diode				1S953	NEC	
D2	G9001HD	Diode				1S953	NEC	
D3	G9023HD	Diode: zener				RD9A	NEC	
D4	G9023HD	Dode: zener				RD9A	NEC	
D5	G9001HD	Diode				1S953	NEC	
D6	G9001HD	Diode				1S953	NEC	
D7	G9001HD	Diode				1S953	NEC	
D8	G9001HD	Diode				1S953	NEC	
D9	G9001HD	Diode				1S953	NEC	
D10	G9001HD	Diode				1S953	NEC	

5.2.1 PCB ASS'Y: AS B9254BK (continued)

Item	Part No.	Part Name & Description		Manufacturer	Remarks
Q1	A9143HQ	TSTR	2SC943	NEC	
Q2	G9141HQ	TSTR	2SA603	NEC	
Q3	A9143HQ	TSTR	2SC943	NEC	
Q4	A9143HQ	TSTR	2SC943	NEC	
Q5	A9143HQ	TSTR	2SC943	NEC	mounted on PWB but not used
U1	G9034LA	IC	μPC157A (1)	NEC	
U2	G9034LA	IC	μPC157A (1)	NEC	
	B9254BN	Printed Wiring Board		YEW	
	A9030YC	Test point (4 pcs.)		YEW	

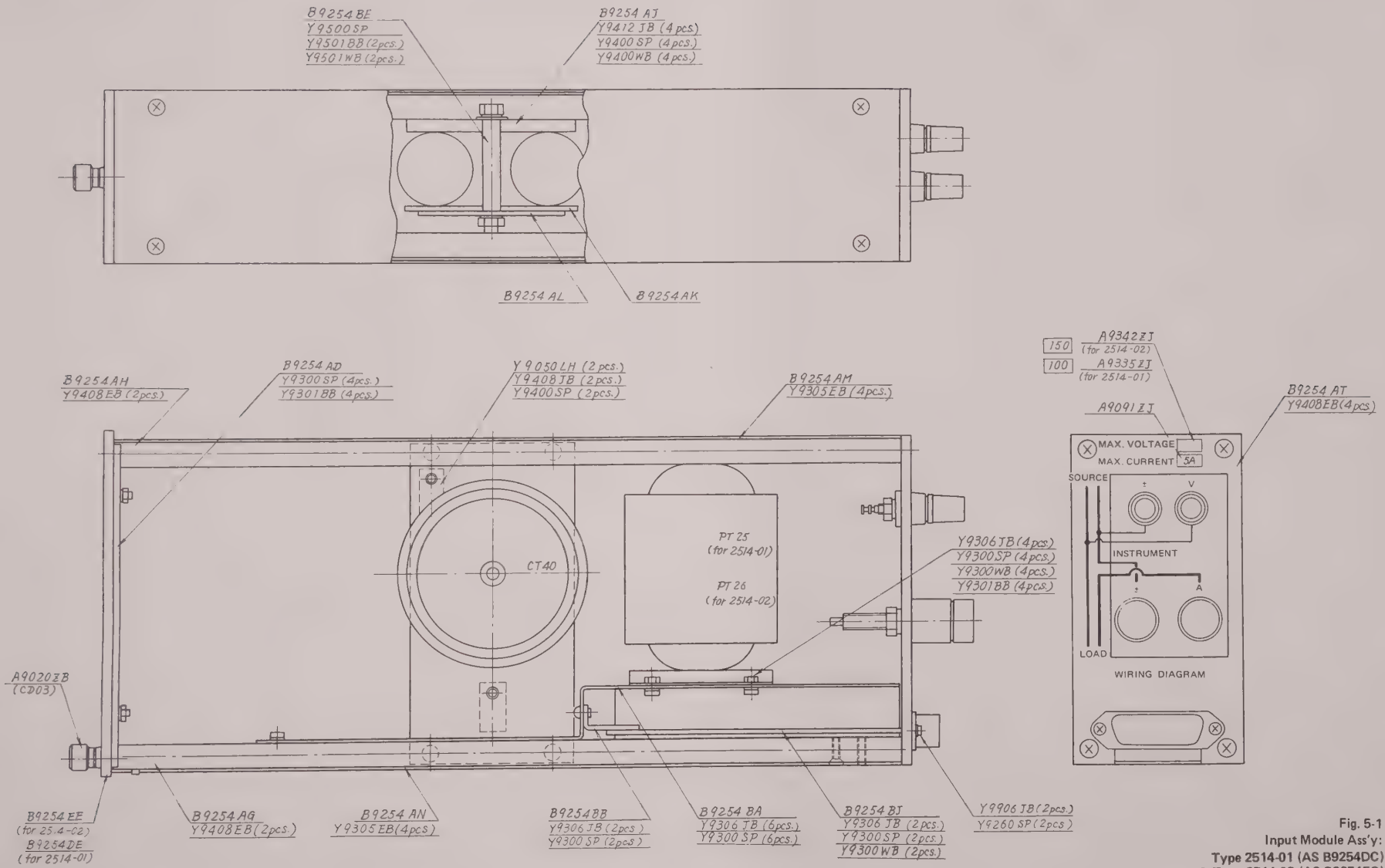

Fig. 5-1
Input Module Ass'y:
Type 2514-01 (AS B9254DC)
& Type 2514-02 (AS B9254EC)

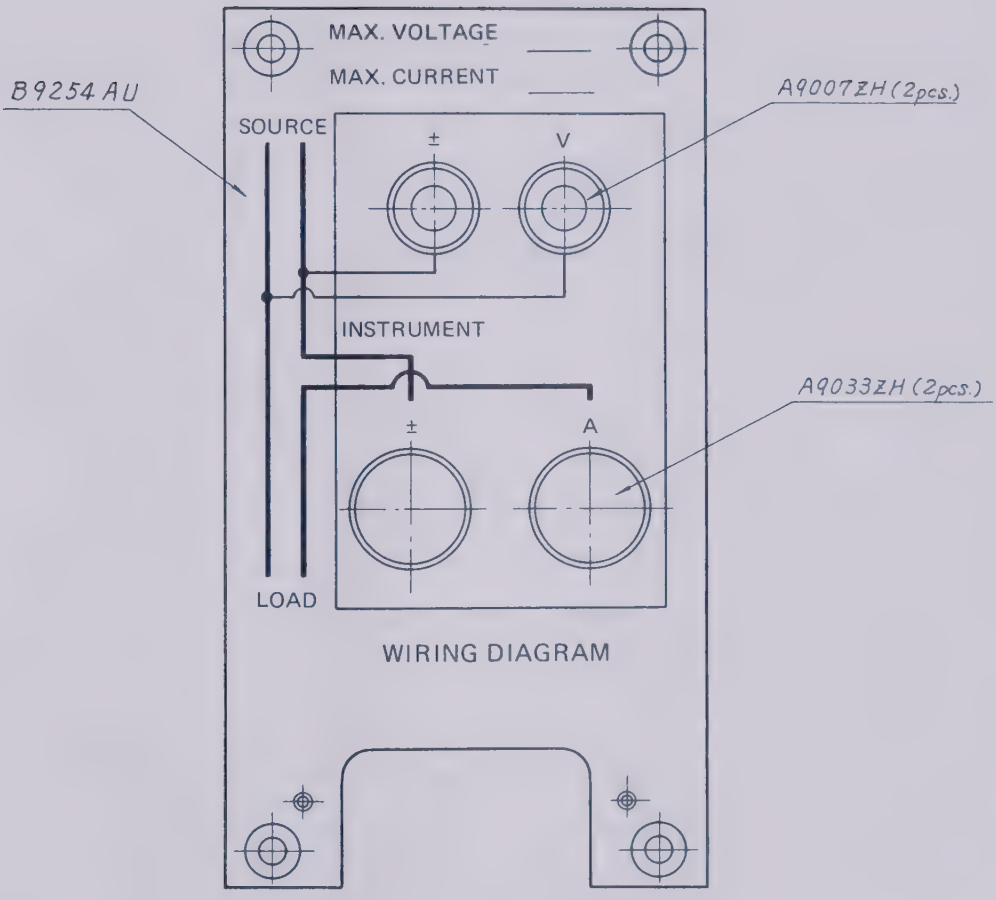

Fig. 5-2 Panel Ass'y: AS B9254AT

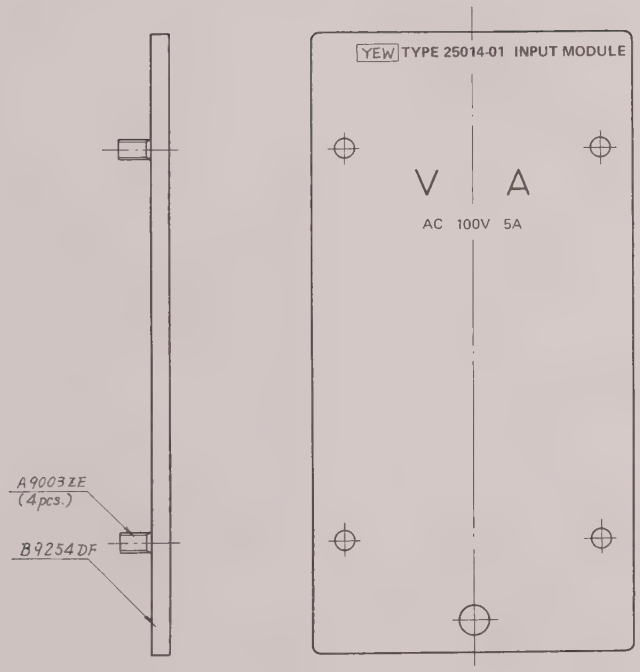

Fig. 5-3a AS B9254DE

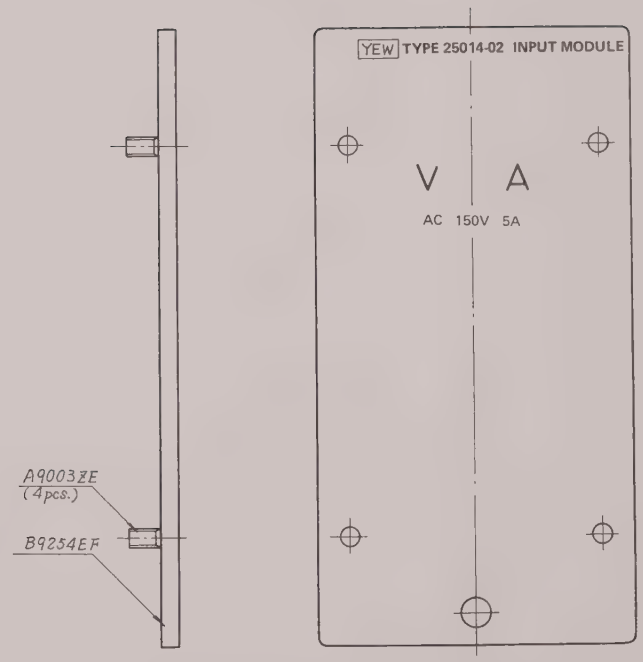

Fig. 5-3b AS B9254EE

Fig. 5-3
Panel Ass'y:
AS B9254DE (for Type 2514-01)
& AS B9254EE (for Type 2514-02)

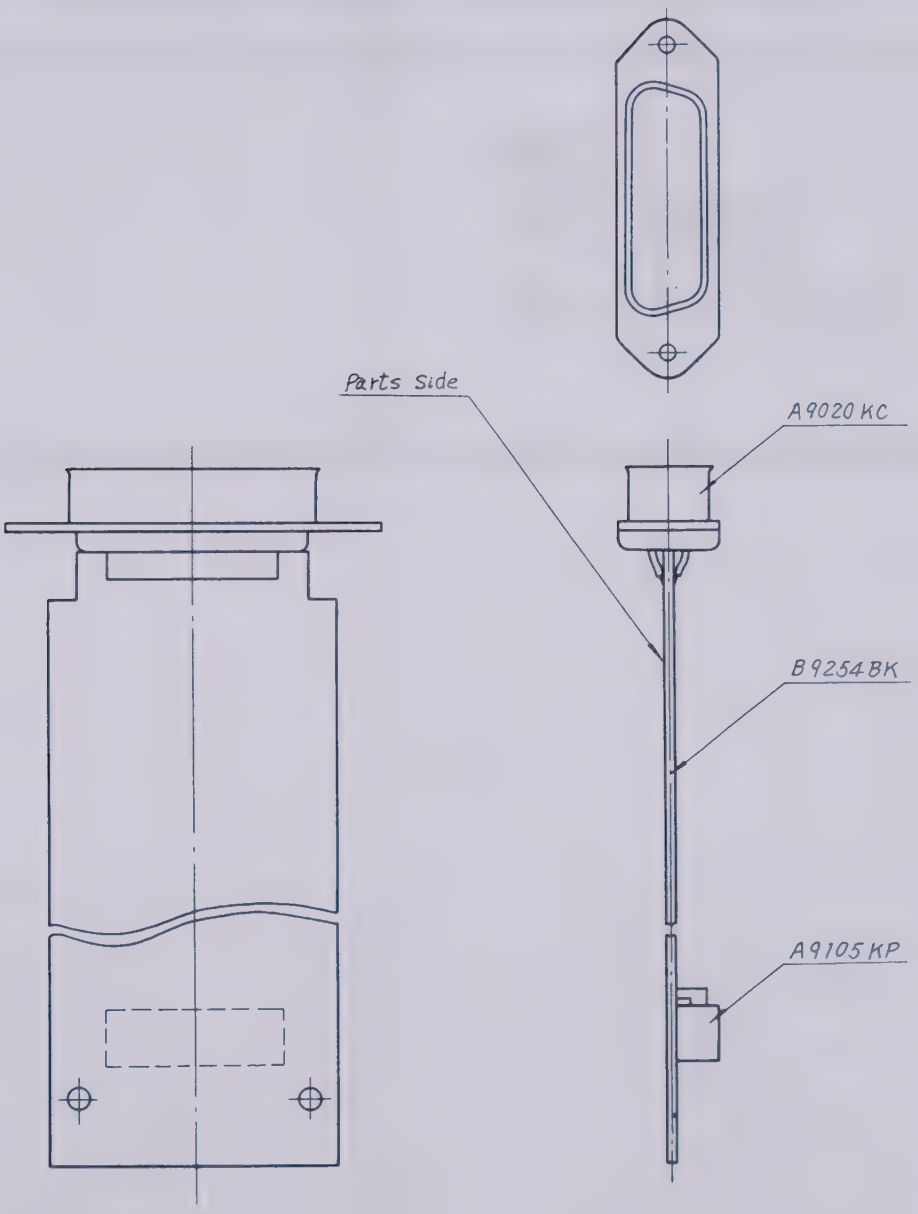

Fig. 5-4 Input Amplifier PCB Ass'y: AS B9254BJ

SERVICE MANUAL

MULTI INPUT MODULE Type 2514-06,07

(For Type 2504 Digital AC Meter)

1975.09.20 – 1st Edition

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1. DESCRIPTION AND OPERATING PRINCIPLE

1.1 Description

Type 2514-06 and 07 are multiple-range plug-in input modules for Type 2504 Digital AC Meter.

Voltage and current inputs are isolated from an input module by means of PT and CT respectively. Range selection is made by switching the primary taps of each transformer.

The output is 1 V rms for both voltage and current sides, and sent out to Type 2504 through a connector located at the lower section of the rear panel. A range signal is simultaneously sent out to the incorporated ranging card to display scaling, unit mark and decimal point for Type 2504-□1, and a normalized indication which has a full scale reading of 1.0000 without a unit mark for Type 2504-□5 which has no ranging card.

Type 2514-06 and 07 are employed for measuring power of commercial frequencies having no dc component, and their measuring ranges are as given below.

	2514-06	2514-07
Voltage Range	30/60/100/150/300V	100/150/300/600V
Current Range	0.5/1/2/5/10A	2/5/10/20A

1.2 Operating Principle

1.2.1 Voltage Input Circuit

Range selection at the voltage input circuit is made by switching over the primary taps of PT as illustrated in Fig. 1-1. The rated voltage of the PT secondary is 5 V rms, which is connected through a shielded wire to PCB Ass'y: AS B9254BJ, where that signal is converted into 1 V rms by an inverted amplifier U1 to obtain an output voltage. C1 and C2 in the figure are phase-compensation capacitors. U1 is protected from input and output by diodes D1, D2, and D3, D4.

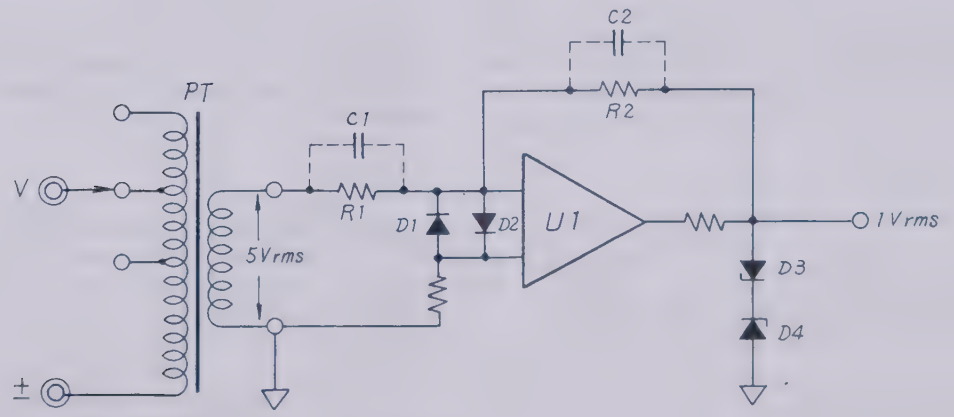


Fig. 1-1 Voltage Input Circuit

1.2.2 Current Input Circuit

The current input circuit is illustrated in Fig. 1-2. The current range selector switch is of a design in which switching from one range to the next is made after the input terminal A is returned to ± line, thereby enabling range selection without disturbing the measuring circuit condition while the input is applied.

The rated current of the CT secondary is 10 mA rms, which is made into an output of 1 V rms through a current-to-voltage converter amplifier U2 and a booster consisting of transistors Q1 and Q2.

Diodes D5 and D6 are intended for eliminating voltage rise in the secondary winding of CT when an overcurrent has flowed through its primary. In normal condition with, the summing point potential of U2 being nearly equal to zero, current doesn't flow through the diodes.

A capacitor C5 connected across R10 is for phase compensation of CT. It carries out phase compensation of the voltage and current within the input module jointly with C1 and C2 on the voltage side.

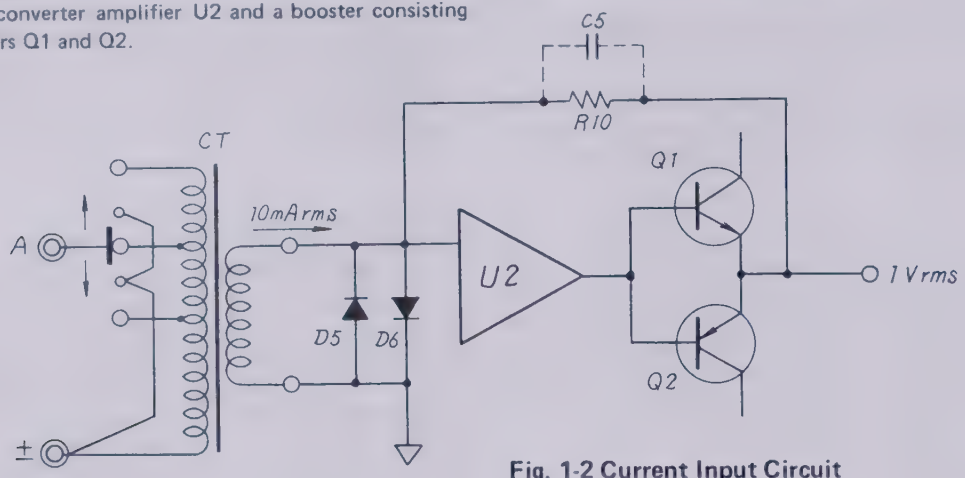


Fig. 1-2 Current Input Circuit

1.2.3 Digital Signal Circuit

Fig. 1-3 shows a digital signal circuit of Type 2514-06 and 07. Refer to Figs. 4-1, 4-2 and 4-3a.

When Range SEL is HIGH (hereinafter referred to as "H") in Type 2504-□□ transistors Q3 and Q4 for V-Range SEL and A-Range SEL are turned on, and open/close signal of each siwtch is transmitted to ROM (Read Only Memory) of Type 2504-□□ through the connector located at the lower section of the rear panel. ROM, judging from such signal, sends out signals for scaling of V, A or W, decimal point and unit.

When scaling is externally made by remote control, such as when external PT and CT are employed, Range SEL is automatically LOW (hereinafter referred to as "L"), thereby turning off Q3 and Q4, and disabling open/close signal operation of each siwtch.

For your informaton, UPPER/LOWER selection circuit comprising Q5 is intended for using the current ranges in two ways. mA ranges can be selected by jumpering connectors (A8) and (B8) but are not used on Type 2514-06 and 07.

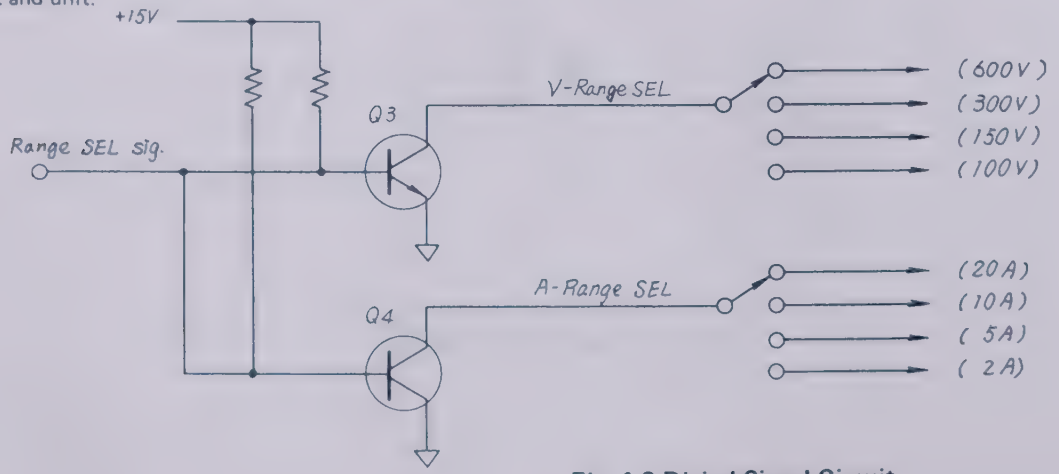


Fig. 1-3 Digital Signal Circuit

2. TEST AND ADJUSTMENT

This chapter concerns test and adjustment of Type 2514-06 and 07, and related specifications.

2.1 Specifications

Type 1524-06 and 07 are intended for combination, as input modules, with Type 2504-□□ (2504-01, 05; 11, 15; and 21, 25).

- ○ Input type: Floating
- ○ Effective measuring span: 30 to 110% of rated value combined with Type 2504-□□ (0 to 110% of rated value for input module alone)
- ○ Operating temperature range: 5 to 40°C bombined with Type 2504-□□ (−10 to +55°C for input module alone)
- ○ Warmup: Approx. 20 min combined with Type 2504-□□ (Approx. 10 min for input module alone)
- ○ Dielectric strength: 2,200 V ac, 50/60 Hz, 1 min
  Between each input terminal and case
  Between each input terminal and output terminal
  Between voltage terminal and current terminal
- ○ Insulation resistance: 50 MΩ min. at 500 V dc
  Between each input terminal and case
  Between each input terminal and output terminal
  Between voltage terminal and current terminal
- ○ Power consumption: Approx. 22 VA combined with Type 2504-□□ (Approx. 0.3 VA for input module alone)
- ○ Dimensions and weight: Approx. 138 x 70 x 368 mm
  Approx. 2.6 kg

- ○ Output terminal signal:

Table 2-1

Pin No.	Details	
	2514-06	2514-07
1		
2	30V range signal	
3	60V range signal	
4	100V range signal	100V range signal
5	150V range seignal	150V range signal
6	300V range signal	300V range signal
7		600V range signal
8	Range SEL	Range SEL
9	Voltage output Vin (1)	Voltage output Vin (1)
10	S.G.	S.G.
11	+15 V power	+15 V power
12		
13		
14	0.5 A range signal	
15	1 A range signal	
16	2A range signal	2 A range signal
17	5 A range signal	5 A range signal
18	10 A range signal	10 A range signal
19		20 A range signal
20		
21	Current output Ain (1)	Current output Ain (1)
22	P.G.	P.G.
23	−15 V power	−15 V power
24		

(Connector used: 57-10240)

Table 2-2 Specifications of Type 2514-06

Combined with 2504-□□	2504-21, 25 / 2504-11, 15		2504-01, 05
Spec. item \ Meas. function	Voltage	Current	Power
Operating principle	PT isolation Range selection by primary tap switching	CT isolation Range selection by primary tap switching	Same as in voltage, current
Rated input	30/60/100/150/300V	0.5/1/2/5/10A	15W to 3kW as combined by V, A ranges
Resolution	10 mV/digit	0.1 mA/digit	10 mW/digit
Freq. range	25 Hz to 2 kHz	25 Hz to 2 kHz	40 Hz to 1.2 kHz
Allowable input crest factor	2 max. at rated value	3 max. at rated value	Same as in voltage, current
Accuracy	47 to 63 Hz : ± (0.25% of rdg + 0.05% of range)		
Combined with 2504-□□ Amb. temp. : 23 ± 3°C Amb. humid. : 45 to 75%RH Source V : 100 V ± 1% Input waveform : Sinusoidal Calib. cycle : 90 days	25 to 47 Hz and 63 Hz to 2 kHz : ± (0.5% of rdg + 0.1% of range)		40 to 47 Hz and 63 Hz to 1.2 kHz ± (0.5% of rdg + 0.1% of range)
	Voltage, current waveform output at 47 to 63 Hz, output current 1 mA rms max., at rated input : 1 V rms ± 0.15%		Influence of power factor ± 0.14% of range at cos φ = 0 ± 0.25% of rdg at cos φ = 0.5 ± 0.7% of rdg at cos φ = 0.2
Temp coefficient Combined with 2504-□□ 5 to 20°C, 26 to 40°C 50 Hz to 1 kHz	Within ± 0.05% of range/°C		Within ± 0.025% of range/°C
Instrument loss At 50 Hz	30 V range: Approx. 5 kΩ 60 V range: Approx. 20 kΩ 100 V range: Approx. 50 kΩ 150 V range: Approx. 100 kΩ 300 V range: Approx. 500 kΩ	0.5 A range: Approx. 0.05 VA 1 A range: Approx. 0.07 VA 2 A range: Approx. 0.1 VA 5 A range: Approx. 0.4 VA 10 A range: Approx. 1.0 VA	Same as in voltage, current
Max. allowable cont. input	3 times range (peak)	3 times range (peak)	
Max. allowable inst. input (1 sec)	3.5 times range (peak)	10 times range (peak)	
Max. allowable cont. common-mode voltage At 50 or 60 Hz	1,000 V	1,000 V	
Influence of common-mode voltage At 50 or 60 Hz	Common-mode voltage rejection ratio 80 dB min. at 1,000 V applied between input terminals connected together and case	Within ± 0.025% of range at 1,000 V applied between input terminal and case	Within ± 0.025% of range at 1,000 V applied between voltage terminal and current terminal, or between input terminal and case

Table 2-3 Specifications of Type 2514-07

Combined 2504-□□	2504-21, 25 / 2504-11, 15		2504-01, 05
Meas. function / Spec. item	Voltage	Current	Power
Operating principle	PT isolation Range selection by primary tap siwtching	CT isolation Range selection by primary switching	Same as in voltage, current
Rated input	100/150/300/600 V	2/5/10/20 A	200 W to 12 kW as combined by V, A ranges
Resolution	10 mV/digit	1 mA/digit	100 mW/digit
Freq. range	25 Hz to 2 kHz	25 Hz to 2 kHz	40 Hz to 1.2 kHz
Allowable input crest factor	2 max. at rated value	3 max. at rated value	Same as in voltage, current
Accuracy	47 to 63 Hz : ± (0.25% of rdg + 0.05% of range)		
Combined with 2504-□□ Amb. temp. : 23 ± 3°C Amb. humid. : 45 to 75%RH Source V : 100 V ± 1% Input waveform : Sinusoidal Calib. cycle: 90 days	25 to 47 Hz and 63 Hz to 2 kHz : ± (0.5% of rdg + 0.1% of range)		40 to 47 Hz and 63 Hz to 1.2 kHz ± (0.5% of rdg + 0.1% of range)
	Voltage, current waveform output at 47 to 63 Hz, output current 1 mA rms max., at rated input : 1 V rms ± 0.15%		Influence of power factor ± 0.14% of range at cos φ = 0 ± 0.25% of rdg at cos φ = 0.5 ± 0.7% of rdg at cos φ = 0.2
Temp coefficient Combined with 2504-□□ 5 to 20°C, 26 to 40°C 50 Hz to 1 kHz	Within ± 0.05% of range/°C		Within ± 0.025% of range/°C
Instrument loss At 50 Hz	100 V range: Approx. 50 kΩ 150 V range: Approx. 100 kΩ 300 V range: Approx. 400 kΩ 600 V range: Approx. 1.5 MΩ	2 A range : Approx. 0.1 VA 5 A range: Approx. 0.4 VA 10 A range: Approx. 1 VA 20 A range: Approx. 2 VA	Same as in voltage, current
Max. allowable cont. input	3 times the range or 1,000 V peak, whichever smaller	3 times the range or 50 A peak, whichever smaller	
Max. allowable inst. input (1 sec)	3.5 times the range or 1,500 V peak, whichever smaller	10 times the range or 70 A peak, whichever smaller	
Max. allowable cont. common-mode voltage At 50 or 60 Hz	1,000 V	1,000 V	
Influence of common-mode voltage At 50 or 60 Hz	Common-mode voltage rejection ratio 80 dB min. at 1,000 V applied between input terminals connected together and case	Within ± 0.025% of range at 1,000 V applied between input terminal and case	Within ± 0.025% of range at 1,000 V applied between voltage terminal and current terminal, or between input terminal and case

2.2 Performance Test Standards

2.2.1 Test Conditions

Ambient termperature: 23 ± 3°C
Ambient humidity: 45 to 75% RH
Power supply voltage: +15 V ± 0.1 V
−15 V ± 0.1 V

2.2.2 Electric Withstand Tests

a) Insulation resistance test (for both Type 2514-06, 07)

Between each input terminal and case
Between each input terminal and circuit — 100 MΩ min. at 1,000 V dc
Between voltage terminal and current terminal
Between circuit and case — 50 MΩ min. at 500 V dc

b) Dielectric strength test (for both Type 2514-06, 07)

Between each input terminal and case
Between each input terminal and circuit — 2,500 V ac, 50/60 Hz, 1 min
Between voltage terminal and current terminal

c) Overinput test

Voltage side : The instrument should remain normal at 100 V range by applying 350 V ac for 10 second (for both Type 2514 - 06, 07).

Current side : The instrument should remain normal at 1 A range by applying 10 A ac for 10 seconds (for Type 2514-06).
The instrument should remain normal at 2 A range by applying 20 A ac for 10 seconds (for Type 2514-07).

2.2.3 Accuracy Test

At rated value of each range and 50/60 Hz
For Type 2514-06

Voltage: : 30 V, 60 V, 100 V, 150 V, 300 V
Current : 0.5 A, 1 A, 2 A, 5 A, 10 A

For Type 2514-07

Voltage : 100 V, 150 V, 300 V, 600 V
Current : 2 A, 5 A, 10 A, 20 A

Test
standard : Output voltage should be 1 V rms ± 0.10%.

2.2.4 Linearity Test

At 50/60 Hz
For Type 2514-06

Voltage : 100 V range
110 V, 100 V, (80 V), 60 V, (40 V), 20 V
Current : 1 A or 5 A range
1.1 A, 1 A, (0.8 A), 0.6 A, (0.4 A), 0.2 A
5.5 A, 5 A, (4 A), 3 A, (2 A), 1 A

For Type 2514-07

Voltage : 100 V range
110 V, 100 V, (80 V), 60 V, (40 V), 20 V
Current : 2A for 5A range
: 2.2 A, 2 A, (1.6 A), 1.2 A, (0.8 A), 0.4 A
5.5 A, 5 A, (4 A), 3 A, (2 A), 1 A

Test
standard: Output voltage should be within
± (0.13% of rdg + 0.02% of range).
Residual output voltage at input zero:
Within ± 0.2 mV for both voltage and current sides
Residual output voltage at input zero: Within ± 0.2 mV for both voltage and current sides

2.2.5 Frequency Characteristic Test

2514-06 : At rated values on 100 V, and 1 A or 5 A ranges
2514-07 : At rated values on 100 V, and 2 A or 5 A ranges

Test
Standard : At 47/63 Hz and 400 Hz
Within ±0.15% of range
At 25 Hz and 2 kHz
Within ±0.3% of range

2.2.6 Phase Difference Test between Voltage and Current

2514-06 : At 100 V, and 1 A or 5 A ranges
2514-07 : At 100 V, and 2 A or 5A ranges

Test
standard : When inputs of the above rated values with power factor 0 (current lead, lag) are applied, the phase difference between voltage and current outputs should be within $\pi/2 \pm 7 \times 10^{-5}$ radians at 50/60 Hz and within $\pi/2 \pm 5 \times 10^{-4}$ radians at 400 Hz.

2.2.7 Common-Mode Rejection Test

Combine Type 2514 with Type 2504-□□, connect a 1 kΩ resistor across the voltage terminal, and jumper the current terminal.

The difference between the reading when 1,000 V 50/60 Hz is applied between the above and case, and the reading when not applied should be within ± 0.02% of the range.

2.2.8 Digital Signal Test

Table 2-4

Pin No.	Signal	
	2514-06	2514-07
1		
2	30 V range signal	
3	60 V range signal	
4	100 V range signal	100 V range signal
5	150 V range signal	150 V range signal
6	300 V range signal	300 V range signal
7		600 V range signal
8	Range SEL	Range SEL
9		
10		
11		
12		
13		
14	0.5 A range signal	
15	1 A range signal	
16	2 A range signal	2 A range signal
17	5 A range signal	5 A range signal
18	10 A range signal	10 A range signal
19		20 A range signal
20		
21		
22	P.G.	P.G.
23		
24		

On connector P1 on the rear panel, when Range SEL signal is "H", only the signal of the pin number corresponding to the range selected by the range selector switch on the front panel should be "L", and all other pins should be "H".

When Range SEL signal is "L", all the pins should be 'H" regardless of range switching.

2.3 Test Method

2.3.1 Description

The input module is normally combined with Type 2504-□□. It is therefore advisable to jointly use Type 2504-11 calibrated for test and adjustment as stated later in 2.4.2.

2.3.2 Electric Withstand Tests

a) Inuslation resistance test

Using an insulation resistance tester (YEW Type 3213 for 1,000 V/2,000 MΩ and 500 V/1,000 MΩ, or an equivalent), test insulation resistance values between each test point stipulated in 2.2.2 a).

b) Dielectric strength test

Using a dielectric strength tester (having an output of 2,500 V ac or higher), test dielectric voltage values between each test point stipulated in 2.2.2 b).

Caution: Carry out the above tests a) and b) with the source power turned off.

c) Overinput test

Using an ac voltage/current standard (YEW Type 2858 or an equivalent) apply inputs as stipulated in 2.2.2 c), and confirm that no anomaly occurs.

2.3.3 Accuracy Test

Combine Type 2514 with Type 2504-11 as stated in 2.3.1, and test accuracy of rated values on all the voltage and current ranges by menas of a test set for Type 2504. For the test set for Type 2504, refer to the service manual for Type 2504.

2.3.4 Linearity Test

Using the same test set as in 2.3.3, test the linearity by taking readings at each test point of the voltage and current ranges stated in 2.2.4.

2.3.5 Frequency Characteristic Test

Using the same test set as in 2.3.3, test the frequency characteristics based on the rated values of the voltage and current ranges stipulated in 2.2.5.

Test frequencies: 25, 50/60, 100, 200, 400 Hz, 1 k, 2 k, 5 kHz

Carry out tests as required for frequencies other than underlined.

2.3.6 Test of Phase Difference between Voltage and Current

Measurement of a phase difference between voltage and current of less than 70 microradians is made by a zero-power-factor test method using a multipiler.

o Calibrate the multiplier used in Type 2504-11 to within 0.02% of f.s. of phase difference through an interchange averaging method.

- Confirm that reading of above Type 2504-11 is within ±7 digits when inputs of 50/60 Hz and power factor zero are applied. Reference of zero of the power factor should be based on Type 2885-11 Standard Watt Converter built in the test set. If reading of Type 2885-11 is not stabilized at 50/60 Hz, test may be carried out at any frequency up to 100 Hz instead of 50/60 Hz.

- Test points are 50/60 Hz and 400 Hz. At 400 Hz, the test standard is ±50 digits.

Note: For interchange averaging method, refer to Chapter 2 of the service manual for Type 2885-11 Standard Watt Converter.

2.3.7 Common-Mode Rejection Test

Using an ac voltage/current standard (YEW Type 2858 or an equivalent), test the common-mode rejection by the difference between reading when 1,000 V ac, 50/60 Hz is applied between each test point stated in 2.2.7, and the reading when not applied.

2.3.8 Digital Signal Test

In the accuracy test stated in 2.3.3, operation of the digital signals can be tested from the selected range and the corresponding reading.

For details of the test method, refer to the service manual for Type 2504 Digital AC Meter.

2.4 Adjustment

2.4.1 Instruments Necessary for Adjustment

Prior to adjustment of Type 2514-06 or 07, prepare the following instruments necessary for adjustment.

- Type 2504-11 which is adjusted to satisfy the conditions in 2.4.2.

- Connecting cable between Type 2514-06, 07 and Type 2504-11.
  Make connection yourself referring to Fig. 2-1.

- Test set for Type 2504
  Refer to the service manual for Type 2504.

- Universal digital multimeter
  YEW Type 2502 or an equivalent

2.4.2 Preparation

Adjust TYpe 2504-11 in the following way as a standard for adjustment.

a) Power Supply Ass'y: AS B9253HA
   ±15 V power supply ···· ±15 V ± 0.05 V
   −15 V power supply ···· −15 V ± 0.05 V

b) Multiplier Ass'y: AS B9253HS
   Output voltage: 5 V ± 2 mV dc when Vin (X) and Ain (Y) are 1 V rms (50/60 Hz, in-phase)
   0 ± 3 mV dc when Vin (X) and Ain (Y) are 1 V rms (50/60 Hz, out of phase by 90°C)
   Feedthrough error: Within ±3 mV (±0.06%)
   Linearity: Within ±0.06%

c) RMS Converter Ass'y: AS B9253HN
   Output voltage: 5 V ± 2 mV dc at input of 1 V rms

d) A/D Converter Ass'y: AS B9253HJ
   Normalized reading: 1.0000 ±2 digits at input of 5 V dc

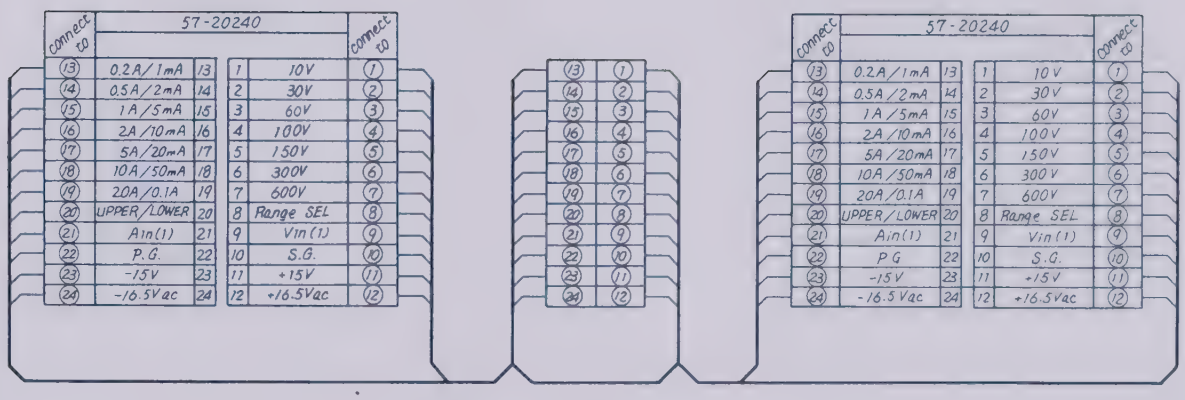
e) Warmup Type 2504-11 for more than thirty minutes and the Type 2514-06, 07 to be adjusted for more than ten minutes.

2.4.3 Adjustment

a) Zero adjustment
   Adjust R8 [V-ADJ] and R9 [A-ADJ] so that voltages measured between intermediate check terminals ⑨ and ⑩, and between ㉑ and ⑩ will be within ± 2mV at an input of zero. (Refer to Figs. 4-3a, 3b).

b) Rated value confirmation
   Confirm that readings on Type 2504-11 are 100.00 V ± 12 digits and 1.0000 A ± 12 digits (or 5.000 A ± 6 digits) when 100 V and 1 A (or 5 A) of 50/60 Hz are applied to the voltage and current input terminals.
   If the above readings are not obtained, check PT, CT, R1, R2 and R10. (Refer to Figs. 4-1, 4-2, 4-3a, 3b.)

c) Phase adjustment
   Adjust C3 so that the error in reading will be within ± 6 digits (or ± 3 digits) at W measureement function when 100 V and 1 A (or 5 A) of 50/60 Hz and 90° out of phase are applied to the input terminals. If the adjustment cannot be made with C3 only, operate C1 or C2 jointly. (Refer to Figs. 4-3a, 3b.)



* Intermediate check terminal board

Fig. 2-1 Connecting Cables for Test

3. TROUBLESHOOTING

Because the circuit construction of Type 2514-06 and 07 is quite simple as is clear from Fig.s 4-2 and 4-3a, an explanation on troubleshooting is omitted.

4. CIRCUIT DIAGRAMS AND PARTS LOCATION

Type 2514-06, 07 INPUT MODULE
Contents of Circuit Diagrams & Parts Location

Par.	Description	Ass'y No.	Fig. No.	Page
1	OVERALL WIRING	AS B9254AC	4 – 1	4–4
		AS B9254FC	4 – 2	4–6
2	INPUT AMPLIFIER PCB ASS'Y	AS B9254BJ	4 – 3a	4–8
	PCB ASS'Y PARTS LOCATION	AS B9254BK	4 – 3b	4–8

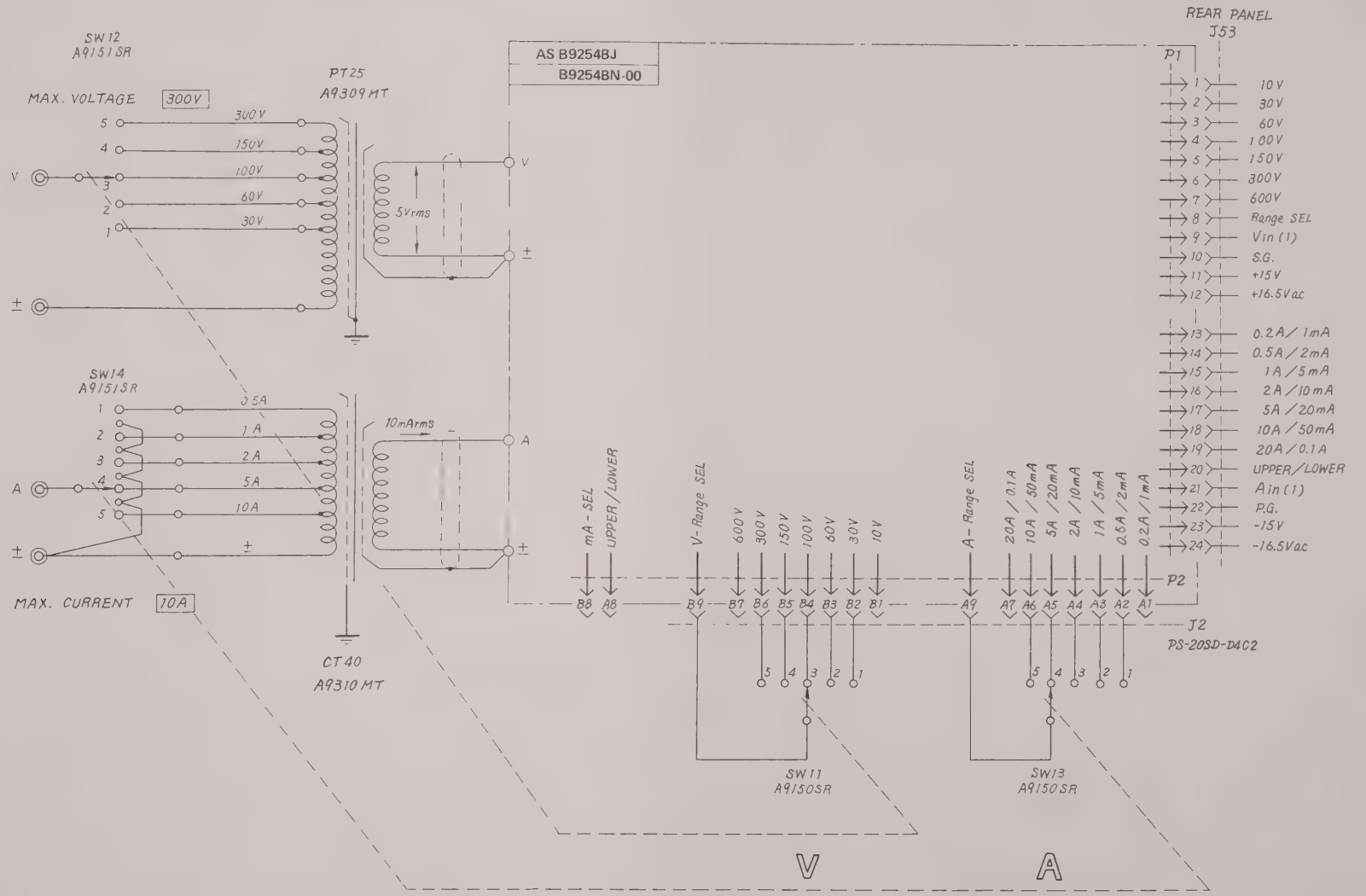


Fig. 4-1 Input Module:
Type 2514-06 (AS B9254AC)
Overall Wiring

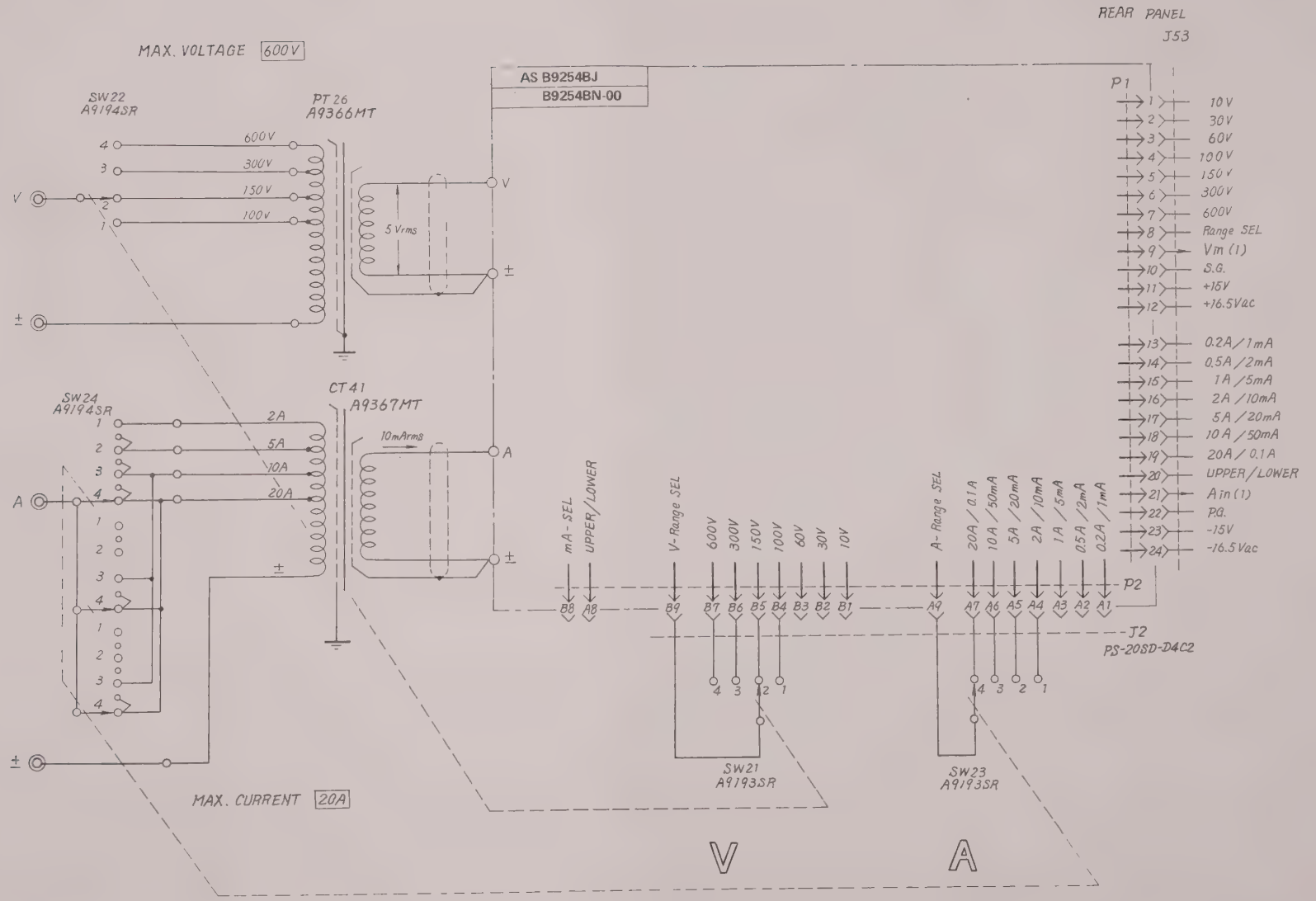


Fig. 4-2 Input Module:
Type 2514-07 (AS B9244FC)
Overall Wiring

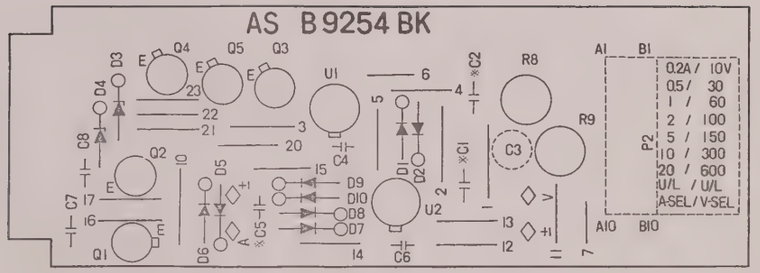


Fig. 4-3b PCB Ass'y: AS B9254BK Parts Location

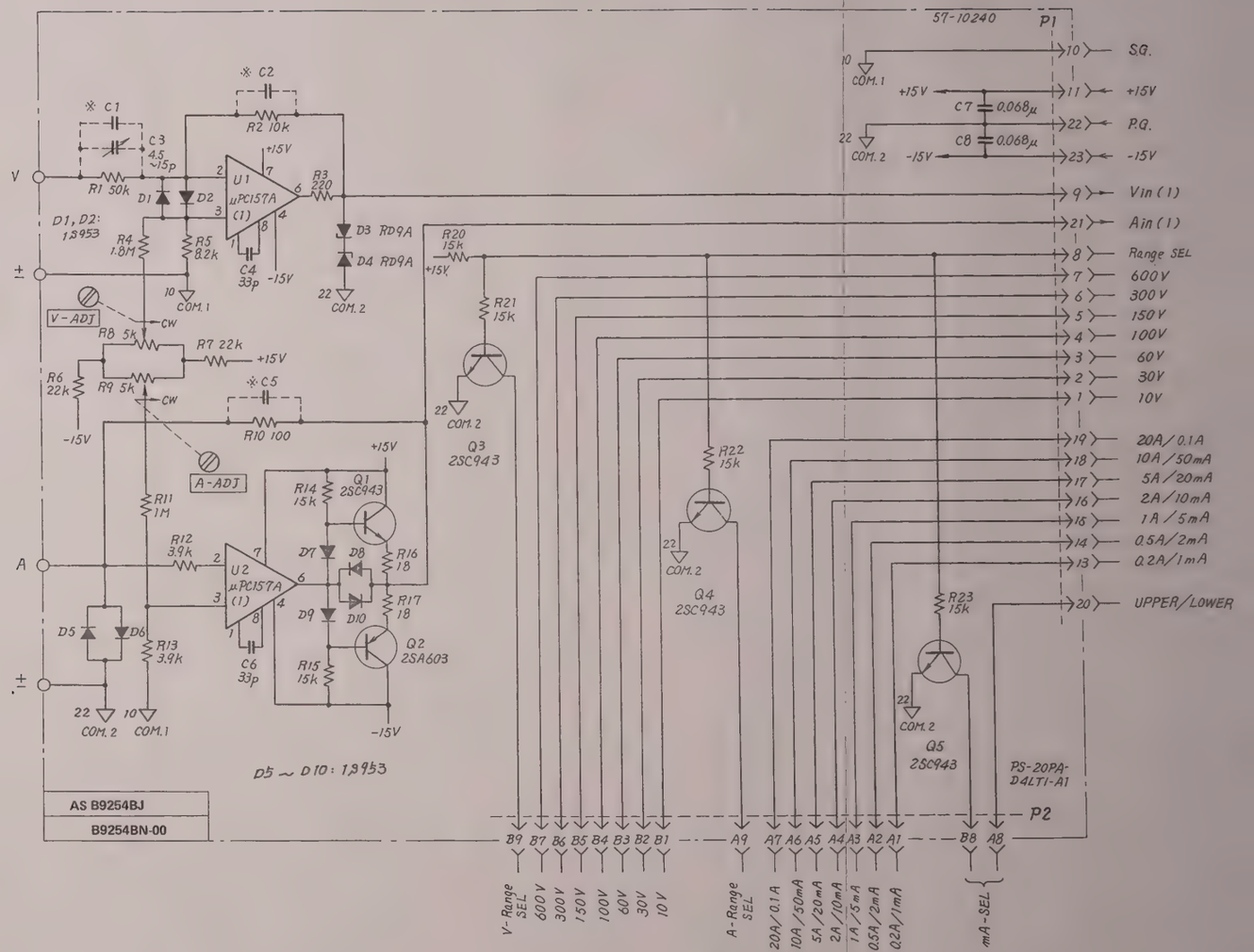


Fig. 4-3a
Input Amplifier
PCB Ass'y: AS B9254BJ

5. PARTS LIST AND STRUCTURAL DIAGRAMS

Contents of Parts List

Par.	Description	Ass'y No.	Fig. No.	Page
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List of abbreviations

ac	=	alternating current
Ag	=	silver (ed)
Al	=	aluminum
amp	=	amplifier
ass'y	=	assembly
Au	=	gold
car flm		carbon film
cap	=	capacitor
cct	=	ceramic
coef	=	coefficient
com	=	common
comp	=	composition
conn	=	connector
dc	=	direct current
dia	=	diameter
elect	=	electrolytic
FET	=	field effect transistor
flm	=	film
fxd	=	fixed
Ge	=	germanium
gnd	=	ground
IC	=	integrated circuit
JIS	=	Japanese Industrial Standard
L	=	inductor
met	=	metal (lized)
mfr	=	manufacturer
Ne	=	neon
nom val	=	nominal value
OSC	=	oscillator
pcb	=	printed circuit board
pwb	=	printed wiring board
plstc	=	plastic
polye	=	polyester
polys	=	polystyrene
pot	=	potentiometer
prec	=	precision (temperature coefficient, long term stability, and/or tolerance)
res	=	resistor
rng	=	range
rtry	=	rotary
Se	=	selenium
sect	=	section(s)
Si	=	silicon
sub-ass'y	=	sub-assembly
sw	=	switch
sys	=	system
sply	=	supply
Ta	=	tantalum
temp	=	temperature
trim	=	trimmer
TSTR	=	transistor
trans	=	transformer
var	=	variable
ww	=	wire wound
YEW spec	=	special specification of Yokogawa Electric Works, Ltd. - YEW.

†	=	Request the item marked with † to YEW.
††	=	Replace the item marked with †† as a complete part set even when one of its parts is damaged Request the complete part set to YEW.
†††	=	Replace the item marked with ††† as an assembly even when a part of itsis damaged. Request the assembly to YEW.
††††	=	Optimum value selected at factory, average value shown (part may be omitted).

Example

Conn	:	multi	= multi connecto
cap	:	fxd Al elect	= Fixed aluminum electrolytic capacitor
Cap	:	fxd met polye flm	= Fixed metallized polyester film capacitor
PCB Ass'y or PCB Ass'y			= Printed circuit board assembly
Res	:	fxd car flm	= Fixed carbon film resistor
Res	:	var ww	= Wirewound variable resistor
Temp coef	=		= Temperature coefficient

5 1 INPUT MODULE ASS'Y : Type 2514-06 (AS B9254AC), Type 2514-07 (AS B9254FC)

Item	Part No.	Part Name & Description		Manufacturer	Remarks
	B9254AG	Rod	(2 pcs.)	YEW	
	B9254AH	Rod	(2 pcs.)	YEW	
	B9254AD	Plate		YEW	
	B9254AE	Bracket		YEW	
	B9254AF	Plate		YEW	
	A9071ZH	Terminal Ass'y	B-TK7F	YEW	
	B9254AJ	Plate		YEW	
	B9254AK	Gasket		YEW	
	B9254AL	Plate		YEW	
	B9254AM	Cover		YEW	
	B9254AN	Cover		YEW	
	B9254AT	Panel Ass'y		YEW	See Fig. 5-2
	B9254AW	Panel Ass'y		YEW	See Fig. 5-3a for 2514-06
	B9254FE	Panel Ass'y		YEW	See Fig. 5-3b for 2514-07
	B9254BA	Plate		YEW	
	B9254BF	Screw Ass'y		YEW	
	A9334ZJ	Name plate		YEW	see Fig. 5-1 for 2514-06
	A9343ZJ	Name plate		YEW	see Fig. 5-1 for 2514-07
	A9097ZJ	Name plate		YEW	see Fig. 5-1 for 2514-06
	A9344ZJ	Name plate		YEW	see Fig. 5-1 for 2514-07
	A9013ZE	Link	(2 pcs.)	YEW	
	A9012ZE	Boss	(4 pcs.)	YEW	
	B9254BB	Bracket		YEW	
	A9027KU	Knob	(2 pcs.) 023-442	ELMA	
	A9036KU	Cap	(2 pcs.) 040-402	ELMA	
	A9020ZB	Panel Lock Ass'y	CD03	YEW	
	Y9050LH	Clamp	(2 pcs.)	YEW	
	Y9408EB	Screw	(8 pcs.) φ4 · ℓ8 · p0.7 · EB	YEW	
	Y9310JB	Screw	(12 pcs.) φ3 · ℓ10 · p0.5 · JB	YEW	
	Y9412JB	Screw	(4 pcs.) φ4 · ℓ12 · p0.7 · JB	YEW	
	Y9306JB	Screw	(14 pcs.) φ3 · ℓ6 · p0.5 · JB	YEW	
	Y9208DB	Screw	(4 pcs.) φ2.3 ℓ8 · p0.4 · DB	YEW	
	Y9906JB	Screw	(4 pcs.) φ2.6 · ℓ6 · p0.45 · JB	YEW	
	Y9408JB	Screw	(2 pcs.) φ4 · ℓ8 · p0.7 · JB	YEW	
	Y9305EB	Screw	(8 pcs.) φ3 · ℓ5 · p0.5 · EB	YEW	
	Y9304SJ	Screw	(8 pcs.)	YEW	
	Y9300SP	Washer: spring	(30 pcs.) φ3		
	Y9400SP	Washer: spring	(10 pcs.) φ4	YEW	
	Y9260SP	Washer: spring	(4 pcs.) φ2.6	YEW	
	Y9500SP	Washer: spring	φ5	YEW	
	Y9300WB	Washer	(14 pcs.) φ3	YEW	
	Y9400WB	Washer	(8 pcs.) φ4	YEW	
	Y9501WB	Washer	(2 pcs.) φ5	YEW	
	Y9301BB	Nut	(8 pcs.) M3 x 0.5	YEW	
	Y9501BB	Nut	(2 pcs.) M5 x 0.8	YEW	
J2	A9108KP	Conn: Jack	PS-20SD-D4C2	JAE	
	A9120KP	Socket contact	PS-SD-C2N-1	JAE	

5.1 INPUT MODULE ASS'Y: Type 2514-06 (AS B9254AC), Type 2514-07 (AS B9254FC) (continued)

Item	Part No.	Part Name & Description	Manufacturer	Remarks
SW11	A9150SR	SW: rtry RS-500V 1-2-5 30°SP	TOSOKU	for 2514-06
SW12	A9151SR	SW: rtry RS-300V 1-2-5 30°SP	TOSOKU	
SW13	A9150SR	SW: rtry RS-500V 1-2-5 30°SP	TOSOKU	
SW14	A9151SR	SW: rtry RS-300V 1-2-1 30°SP	TOSOKU	
SW21	A9193SR	SW: rtry RS-500V 1-2-4 30°SP	TOSOKU	for 25/4-07
SW22	A9194SR	SW: rtry RS-300VET 1-3-4 30°SP	TOSOKU	
SW23	A9193SR	SW: rtry RS-500V 1-2-4 30°SP	TOSOKU	
SW24	A9194SR	SW: rtry RS-300VET 1-3-4 30°SP	TOSOKU	
PT25	A9309MT	Trans: Potential	YEW	for 2514-06
PT26	A9366MT	Trans: Potential	YEW	
CT40	A9310MT	Trans: Current	YEW	for 2514-06
CT41	A9367MT	Trans: Current	YEW	for 2514-07
	B9254BJ	INPUT AMPLIFIER PCB Ass'y		see 5.2, Fig. 5-4

5.2 INPUT AMPLIFIER PCB ASS'Y: AS B9254BJ

Item	Part No.	Part Name & Description	Manufacturer	Remarks
	B9254BK	PCB Ass'y	YEW	see 5.2.1
P1	A9020KC	Conn: Plug 57-10240	APPHENOL	
P2	A9105KP	Conn: Plug PS-20PA-D4LT1-A1	JAE	

5.2.1. PCB ASS'Y: AS B9254BK

Item	Part No.	Part Name & Description					Manufacturer	Remarks
R1	A9189RN	Res: fxd met film	50kΩ	±0.05%	1/8W	RN60E50kΩA	TOKYO KO-ON	±25ppm/°C
R2	A9185RN	Res: fxd met film	10kΩ	±0.05%	1/8W	RN60E10kΩA	TOKYO KO-ON	±25ppm/°C
R3	A9025RS	Res: fxd car comp	220Ω	±10%	¼W	RC¼GF220ΩK	TOKYO KO-ON	
R4	A9072RS	Res: fxd car comp	1.8MΩ	±10%	¼W	RC¼GF1.8MΩK	TOKYO KO-ON	
R5	A9044RS	Res: fxd car comp	8.2kΩ	±10%	¼W	RC¼GF8.2kΩK	TOKYO KO-ON	
R6	A9172RM	Res: fxd met film	22kΩ	±5%	¼W	RE 50YR22kΩJ	SUSUMU	
R7	A9172RM	Res: fxd met film	22kΩ	±5%	¼W	RE50YR22kΩJ	SUSUMU	
R8	A9403RV	Res: var ww	5kΩ	±10%	0.37W	λ-6F 5kΩ	COPAL	
R9	A9403RV	Res: var ww	5kΩ	±10%	0.37W	λ-6F 5kΩ	COPAL	
R10	A9169RN	Res: fxd met film	100Ω	±0.05%	1/8W	RN60E100ΩA	TOKYO KO-ON	±25ppm/°C
R11	A9069RS	Res: fxd car comp	1MΩ	±10%	¼W	RC¼GF1MΩK		
R12	A9040RS	Res: fxd car comp	3.9kΩ	±10%	¼W	RC¼GF3.9kΩK		
R13	A9040RS	Res: fxd car comp	3.9kΩ	±10%	¼W	RC¼GF3.9kΩK		
R14	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R15	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R16	A9013RS	Res: fxd car comp	22Ω	±10%	¼W	RC¼GF22ΩK		
R17	A9013RS	Res: fxd car comp	22Ω	±10%	¼W	RC¼GF22ΩK		
R18		not used						
R19		not used						
R20	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		
R21	A9047RS	Res: fxd car comp	15kΩ	±10%	¼W	RC¼GF15kΩK		

5.2.1 PCB ASS'Y: AS B9254BK (continued)

Item	Part No.	Part Name & Description	Manufacturer	Remarks
R22	A9047RS	Res: fxd car comp 15kΩ ±10% ¼W RC¼GF15kΩK		
R23	A9047RS	Res: fxd car comp 15kΩ ±10% ¼W RC¼GF15kΩK		
C1	A9014CN	Cap: fxd mica 12pF ±10% 100V DM05C120K1	NITSUKO	††††
C2	A9027NC	Cap: fxd mica 150pF ±10% 100V DM05C151K1	NITSUKO	††††
C3	A9023CV	Cap: var cer 4.5~15pF 60V DT-05D150	MURATA	
C4	A9019CN	Cap: fxd mica 33pF ±10% 100V DM05C330K1	NITSUKO	
C5	G9025CY	Cap: fxd polye flm 6.800pF ±10% 50V MFL-5002-682K	MATSUO	††††
C6	A9019CN	Cap: fxd mica 33pF ±10% 100V DM05C330K1	NITSUKO	
C7	G9017CY	Cap: fxd polye flm 0.068μF ±10% 50V MFL-5002-683K	MATSUO	
C8	G9017CY	Cap: fxd polye flm 0.068μF ±10% 50V MFL-5002-683K	MATSUO	
D1	G9017CH	Diode 1S953	NEC	
D2	G9001HD	Diode 1S953	NEC	
D3	G9023HD	Diode: zener RD9A	NEC	
D4	G9023HD	Diode: zener RD9A	NEC	
D5	G9001HD	Diode 1S953	NEC	
D6	G9001HD	Diode 1S953	NEC	
D7	G9001HD	Diode 1S953	NEC	
D8	G9001HD	Diode 1S953	NEC	
D9	G9001HD	Diode 1S953	NEC	
D10	G9001HD	Diode 1S953	NEC	
Q1	A9143HQ	TSTR 2SC943	NEC	
Q2	G9141HQ	TSTR 2SA603	NEC	
Q3	G9143HQ	TSTR 2SC943	NEC	
Q4	G9143HQ	TSTR 2SC943	NEC	
Q5	G9143HQ	TSTR 2SC943	NEC	mounted on PWB but not used
U1	G9034LA	IC μPC157A(1)	NEC	
U2	G9034LA	IC μPC157A(1)	NEC	
	B9254BN	Printed Wiring Board	YEW	
	A9030YC	Test point (4 pcs.)	YEW	

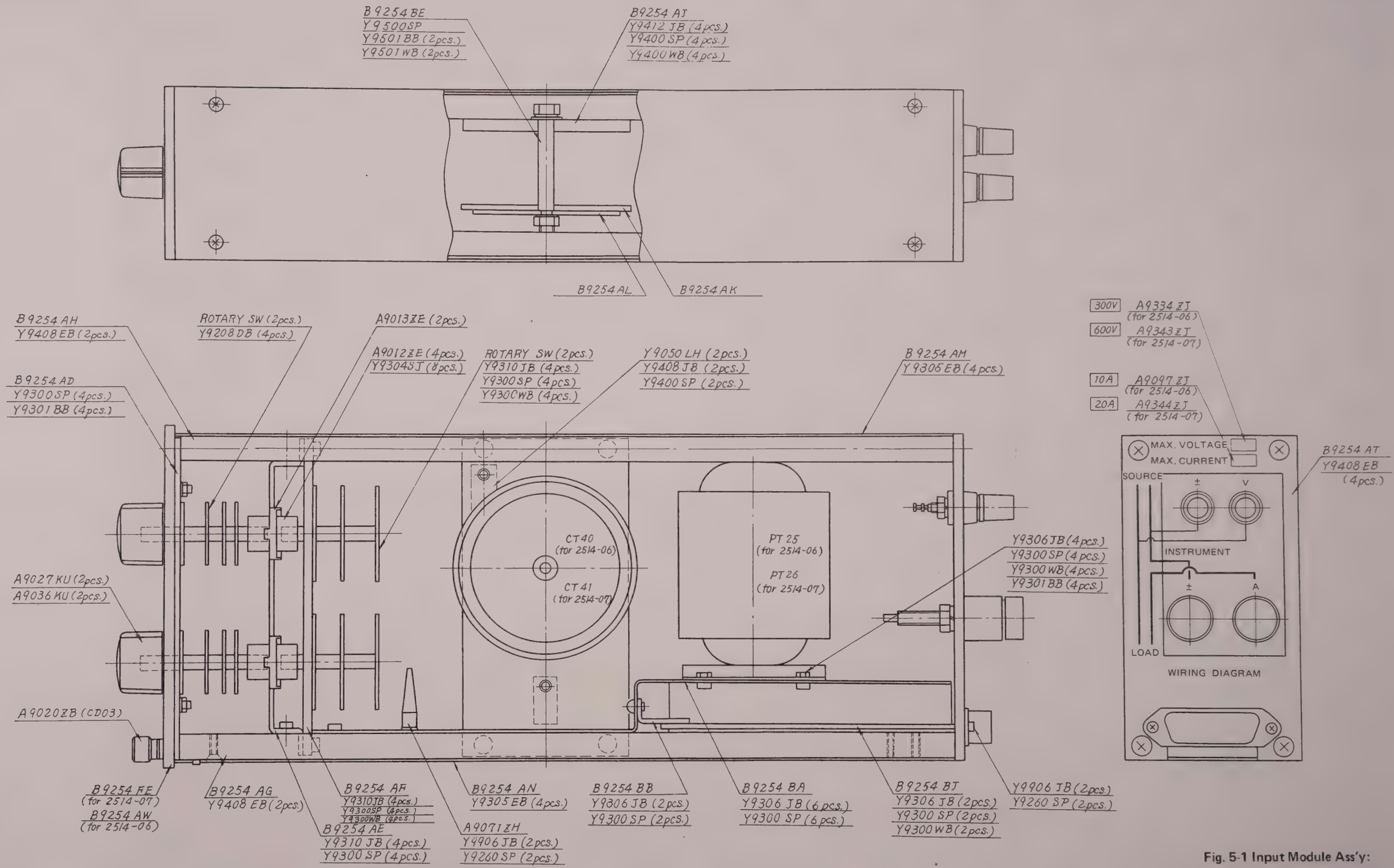

**Fig. 5-1 Input Module Ass'y:
Type 2514-06 (AS B9254AC)
& Type 2514-07 (AS B9254FC)**

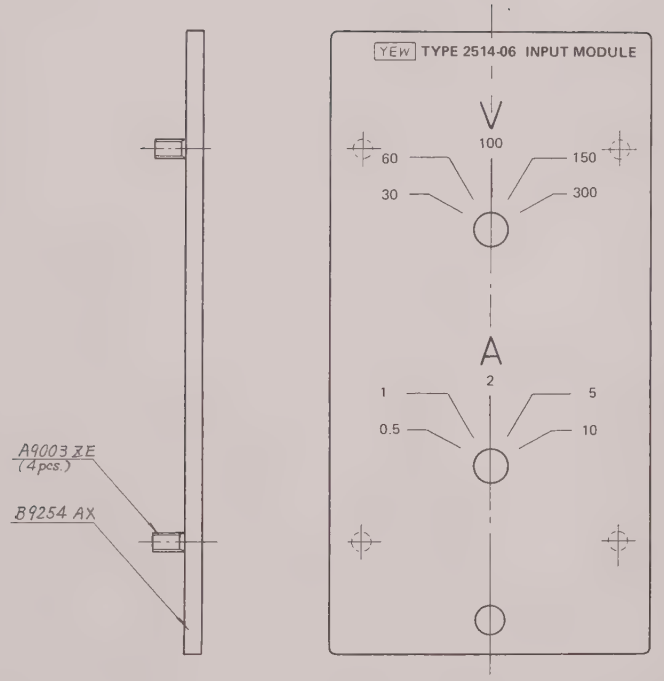

Fig. 5-3a AS B9254AW

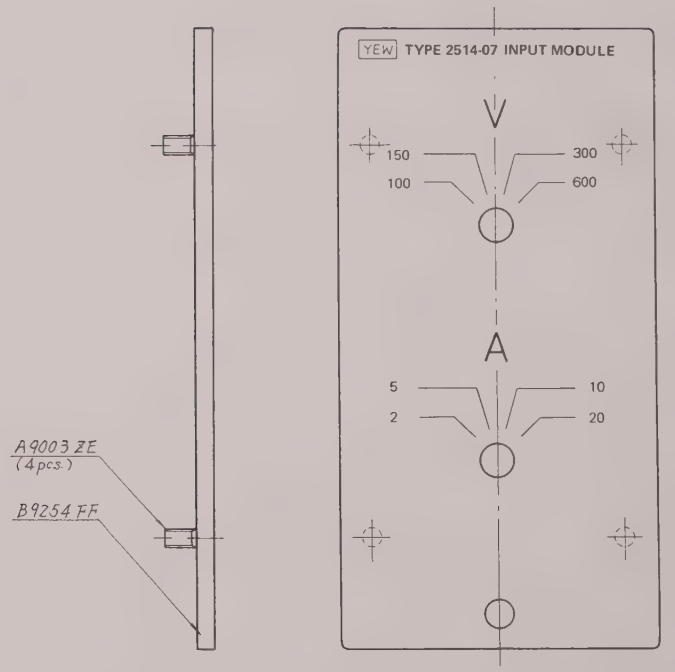

Fig. 5-3b AS B9254FE

Fig. 5-3 Panel Ass'y:
AS B9254AW (for Type 2514-06)
& AS B9254FE (for Type 2514-07)

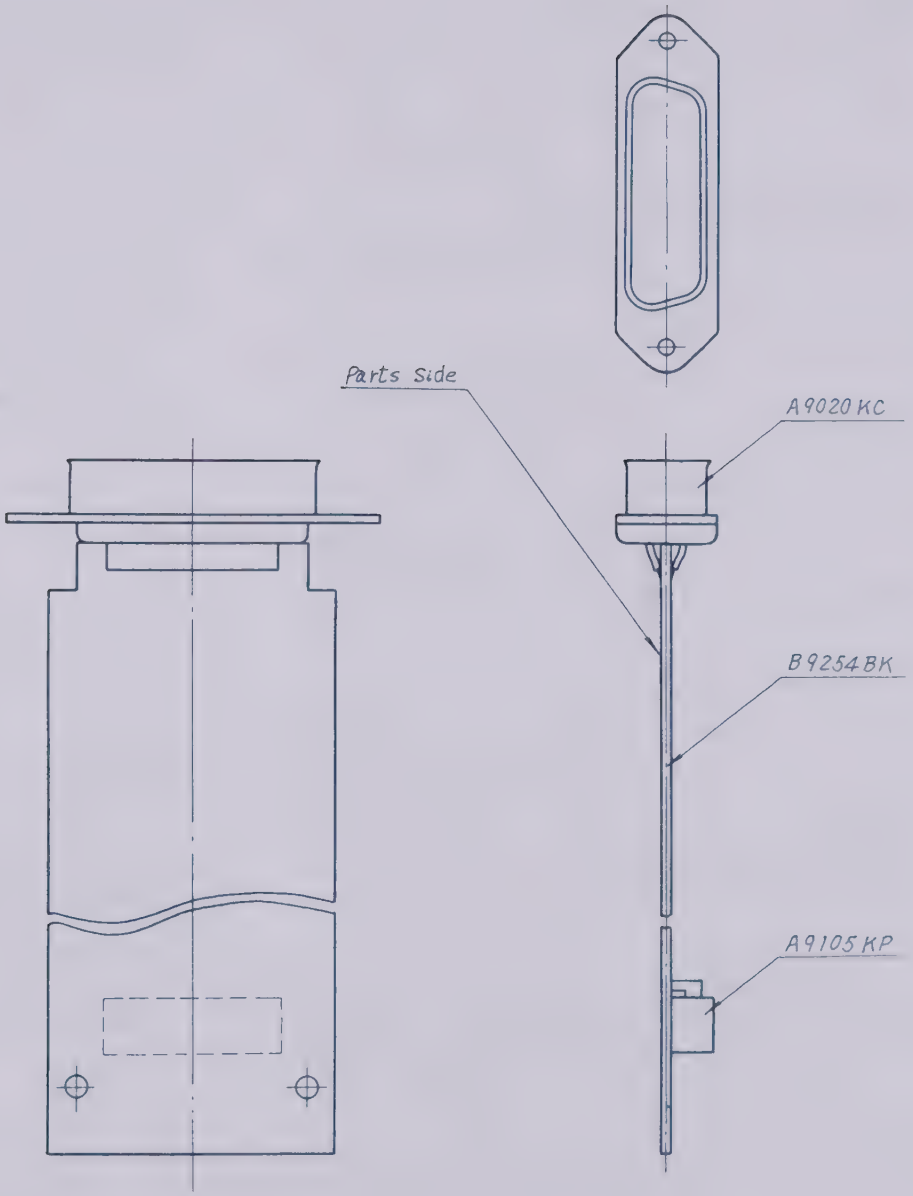

Fig. 5-4 Input Amplifier PCB Ass'y: AS B9254BJ

MAIN PRODUCTS

Classification	Product Group	Name
Electrical Measuring and Recordihg Instruments	Electrical Indicating Instruments	Laboratory Standard & Portable Instruments, Panel & Switchboard Instruments.
	Transducers	AC Voltage, AC Current, Watt, Reactive Power, Phase and Frequency Transducers.
	Tachometers	Photo Tachometers, Panel & Switchboard Tachometers.
	Temperature Measuring Instruments	Thermocouple Thermometers, Thermistor Thermometers, Digital Thermometers, Temperature Data Acquisition Systems, Surface Temperature Indicators.
	Precision Measuring Instruments	DC Galvanometers, DC Potentiometers, Bridges.
	Resistors	Standard Resistors, Dial Resistors, Slide Resistors.
	Power Measuring Instruments	Standard Watt Converters, Precision Digital Wattmeters, Digital AC Meters, Digital Power Meters.
	Standard Instruments	Voltage / Current Standards, Voltage / Current Calibration Sets, AC power Calibration Systems.
	Oscillographs	Photocorders (Electromagnetic Oscillographs), Micro Pen-Oscillograph.
	Recorders	Direct-Acting Electrical Recorders, Flatbed Recorders, Laboratory Recorders, X-Y Recorders.
	Peripheral Equipment for Oscillographs and Recorders	Series Resistor, Shunt Resistor, DC Amplifiers, Strain Amplifiers, Logarithmic Converter, F-V Converter.
	Field Testers	Circuit Testers, Insulation Testers, Earth Resistance Testers,
	Magnetic Materiai Testing Equipment	Gauss Meter, Electronic Fluxmeter, Epstein Iron Loss Test Sets, Hysteresis Loop Tracers.
	Analog Computers	Analog Computers, Logic Assemblies.
Industrial Process Instruments	EBS Series Electronic Instruments, ERB Series Electronic Instruments, PCI Series Pneumatic Instruments	For measurement and control of Temperature, Pressure, Flow, Liquid Level, Density, Humidity, Dewpoint, Displacement, Velocity, Position, Speed, Electrical Quantity, etc.
Analytical Instruments	Instruments for Liquid Analysis	pH Meters, Turbidity Measuring Instruments, Liquid Density Measuring Instruments, Solution Conductivity Measuring Instruments, Viscosity Measuring Instruments, Process ORP Instrumentation, Petroleum Sulfur Analyzer.
	Instruments for Gas Analysis	Gas Chromatographs, SO_2 Measuring Instruments
	Radiation Instruments	β Ray Thickness Gauge, γ Ray Density Meter.
Digital Control Systems	Direct Digital Control Systems, Computer Control Systems, Digital Blending Control Systems	

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